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THREE-COMPONENT LDV MEASUREMENTS OF CORNER VORTICES OVER SECOND-GENERATION, CONTROLLED-DIFFUSION, COMPRESSOR BLADES IN CASCADE

by

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September 2001

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THREE-COMPONENT LDV MEASUREMENTS OF CORNER VORTICIES OVER SECOND-GENERATION, CONTROLLED-DIFFUSION, COMPRESSOR BLADES IN CASCADE

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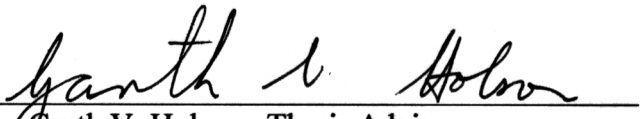
Approved by: 
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A detailed investigation of the three-dimensional flow in a cascade of second-generation controlled-diffusion compressor stator blades, at off-design inlet-flow angle, is reported. Three-component fiber-optic Laser-Doppler Velocimetry (LDV) surveys were made to fully map the flow at one plane upstream of the cascade and at three planes downstream. The measurements were performed at an inlet flow Mach number of 0.22 and a Reynolds number, based on chord length, of 640,000. The inlet surveys documented the approaching flow field in detail to establish the inlet boundary conditions for numerical simulations. At the downstream planes, total velocity distributions, total turbulence kinetic energy distributions, secondary flow velocity vector and contour plots are presented. The downstream surveys confirmed the existence of secondary flow vortices produced by the end wall. Surface vector and contour plots of non-dimensional velocity and total turbulence kinetic energy detail the complex flow field, including the size and location of the corner vortex system.

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LIST OF SYMBOLS

c	blade chord
Cac	fraction of axial chord
h	blade span
Re	Reynolds number
S	blade spacing
U	axial velocity component
V	tangential velocity component
Vref	reference velocity (test section inlet velocity)
W	spanwise velocity component
X	dimensionless velocity
X'	traverse coordinate position
Y'	traverse coordinate location
Z'	traverse coordinate station
y/S	non-dimensionalized pitchwise direction
z/h	non-dimensionalized spanwise direction
$k/(Vref^2)$	non-dimensionalized total turbulence kinetic energy
Utot	total velocity (with components U,V,W)
β_1	tunnel inlet flow angle
β_2	tunnel outlet angle
β_{1w}	tunnel sidewall setting angle
β_{2w}	tunnel tailwall setting angle
δ	boundary layer thickness

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I. INTRODUCTION

A. BACKGROUND

The analysis of airflow over a blade row in a linear cascade is used to aid in the design of axial flow compressors. The linear cascade can be used to model the flow over compressor blades in a 2-D sense, by neglecting the radial component of the flow vector.

The need for smaller and more powerful engines to meet the demands of today's aircraft has led to increased requirements for blade loading, improved performance at the design point and the ability to operate at off-design conditions without compressor stall. This has led to the development of controlled-diffusion (CD) blading.

Controlled-diffusion blading allows blades to be specifically designed to produce the desired pressure distribution, while avoiding boundary-layer separation on the suction side of the blade. This allows higher blade loading, thus providing more turning for each blade row and therefore fewer blades to obtain the desired pressure ratio within a compressor, or a higher-pressure ratio with the same number of blades. Thus compressor size and weight can be reduced for a given engine thrust.

Controlled-diffusion blading was made possible by the development of Computational Fluid Dynamics (CFD) techniques. Since CFD is an integral part of the blade design process, validation data must be gathered in order to continue the development for more efficient, higher performance blading.

The CD compressor blades investigated in the current study were designed by Thomas F. Gelder of NASA Lewis Research Center [Ref. 1]. The compressor stator profiles were Stator 67B blades, which together with Rotor 67, comprised Compressor Stage 67B. The Stator 67B blades were second-generation CD blades, which were designed as an improvement over Stator 67A, a first-generation CD blade designed by Nelson Sanger [Ref. 2].

The present study was an investigation of flow through Compressor Stage 67B CD compressor blades in the Naval Postgraduate School (NPS) low-speed cascade wind

tunnel (LSCWT). Hanson [Ref. 3] examined the flow through the mid-span section at a near-design inlet flow angle of 36.3°, using Laser-Doppler Velocimetry (LDV) and pressure probe measurements. Schnorenberg [Ref. 4] studied the off-design flow characteristics at an angle of 38°. LDV measurements, flow visualization, and blade surface pressure measurements were used to investigate the effect of Reynolds number on a separation region detected near mid-chord. Grove [Ref. 5] characterized the flow patterns at an inlet flow angle of 39.5°. Flow visualization, rake probe surveys, blade surface pressure measurements and LDV measurements were used to document the flow upstream, in the passages between the blades, in the boundary layer of the blades, and in the wake region. Nicholls [Ref. 6] characterized and compared the flow patterns over and around the blades after the replacement of the wind tunnel motor. The inlet flow angle was found to have increased from 39.5° to 40° with no movement of the blades in the tunnel. Carlson [Ref. 7] characterized the three-dimensional flow behavior in the end-wall region of the cascade. Five-hole pressure probe and two-component LDV measurements were used to characterize the flow upstream of the blades and in the wake region. CFD studies were also initiated to compare blade surface pressure distributions at various inlet flow angles and inlet boundary layer thickness.

B. PURPOSE

The objective of the current study was the characterization of the three-dimensional flow behavior upstream and downstream of the CD blades in the linear cascade. Three-component LDV measurements were used to characterize the flow upstream of the blades and in the wake region of the blades at a Reynolds number of 640,000. The purpose of performing these measurements was to determine the extent of the corner vortex system that resulted in mid-span flow separation on the blades as conducted by Schnorenberg [Ref. 4] and Nicholls [Ref. 6]. Inlet surveys were conducted to document the approaching flow field so that the correct inlet boundary conditions could be determined for comparison with CFD predictions. These LDV measurements complimented the five-hole probe wake measurements performed by Carlson [Ref. 7].

II. TEST FACILITY AND INSTRUMENTATION

A. LOW-SPEED CASCADE WIND TUNNEL

The present study was conducted in the Low-Speed Cascade Wind Tunnel (LSCWT) located at the Naval Postgraduate School's Turbopropulsion Laboratory. The wind tunnel is powered by a 550-hp electric motor driving a turbo-vane blower, and is capable of producing a sustained maximum free stream Mach number of 0.4 in the test section. Figure 1 shows a schematic of the cascade in the Low Speed Turbomachinery Building (Bldg. 213) with the associated plenum chamber, drive system, and inlet and exhaust ducting. All aspects of the tunnel remain as previously documented by Nicholls [Ref. 6].

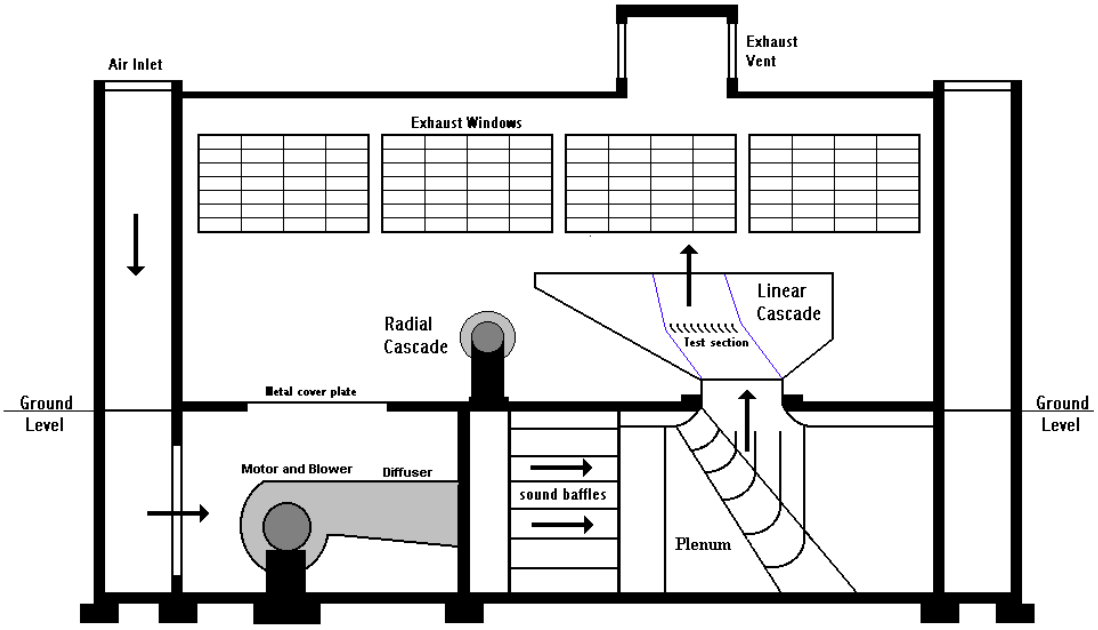


Figure 1. NPS Cascade Wind Tunnel Facility [From Ref. 7]

B. TEST SECTION

The test section of the LSCWT contained 10 Stator 67B controlled-diffusion blades. The installation of the blades in the test section was detailed by Hansen [Ref. 3]. A detailed layout of the test section is shown in Figure 2.

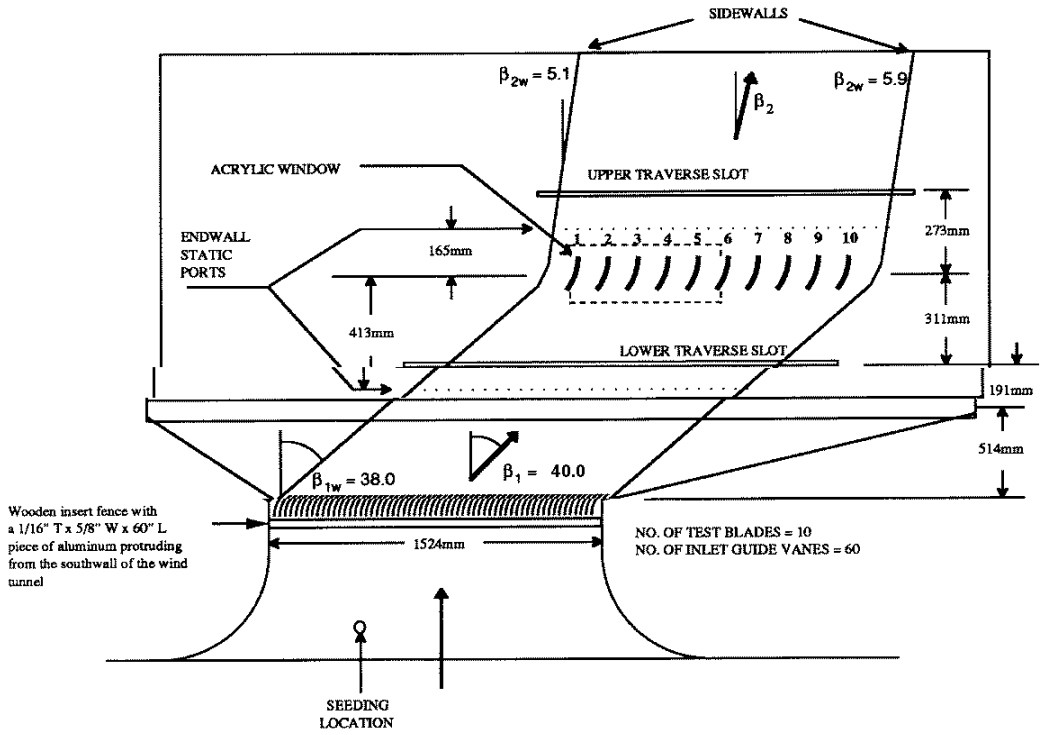


Figure 2. Test Section Schematic [From Ref. 7]

The blades were scaled from the mid-span section of the Stator 67B [Ref. 1]. The coordinates used to machine the blades were documented in Hanson [Ref. 3]. Each blade was 254 mm in span, 127.25 mm in chord and set with blade spacing of 152.4 mm.

The blade profile is shown in Figure 3.

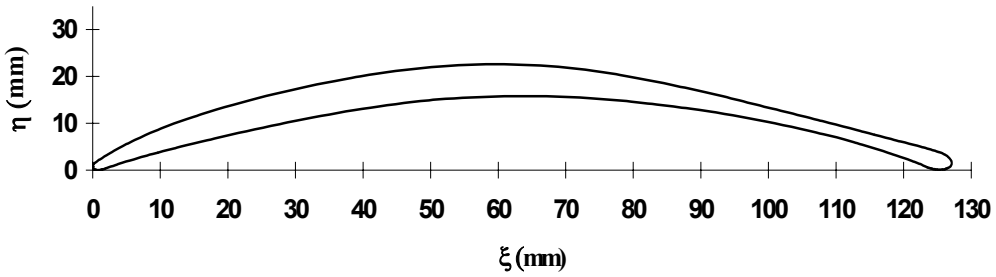


Figure 3. Blade Profile [From Ref. 7]

LDV measurements were conducted between blades 3 and 4. These blades were anodized black to minimize laser light backscatter. A photograph of the 10 CD blades mounted in the test section of the LSCWT with the north wall of the tunnel removed is shown below in Figure 4.

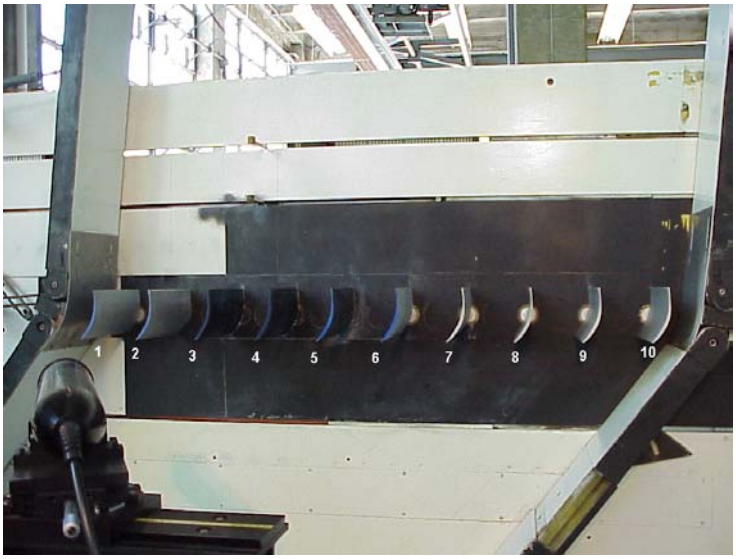


Figure 4. CD Blades Mounted in LSCWT

C. LDV INSTRUMENTATION AND DATA ACQUISITON

The LDV system utilized for this work was a TSI three-component fiber-optic system. There were four major subsystems to this system: laser and optics, data acquisition system, traverse table and seeding mechanism. Figure 5 shows the 5-Watt Argon-ion laser and TSI Color Separator.

Figure 5. Argon-Ion Laser and Color Separator

Figure 6 shows the optical probes mounted on the traverse mechanism and the data acquisition system (PC) with the TSI IFA 750 data processor.

Figure 6. Optical Probes, Traverse and Data Acquisition System

Figure 7 is a schematic of the laser and optics of the TSI LDV system.

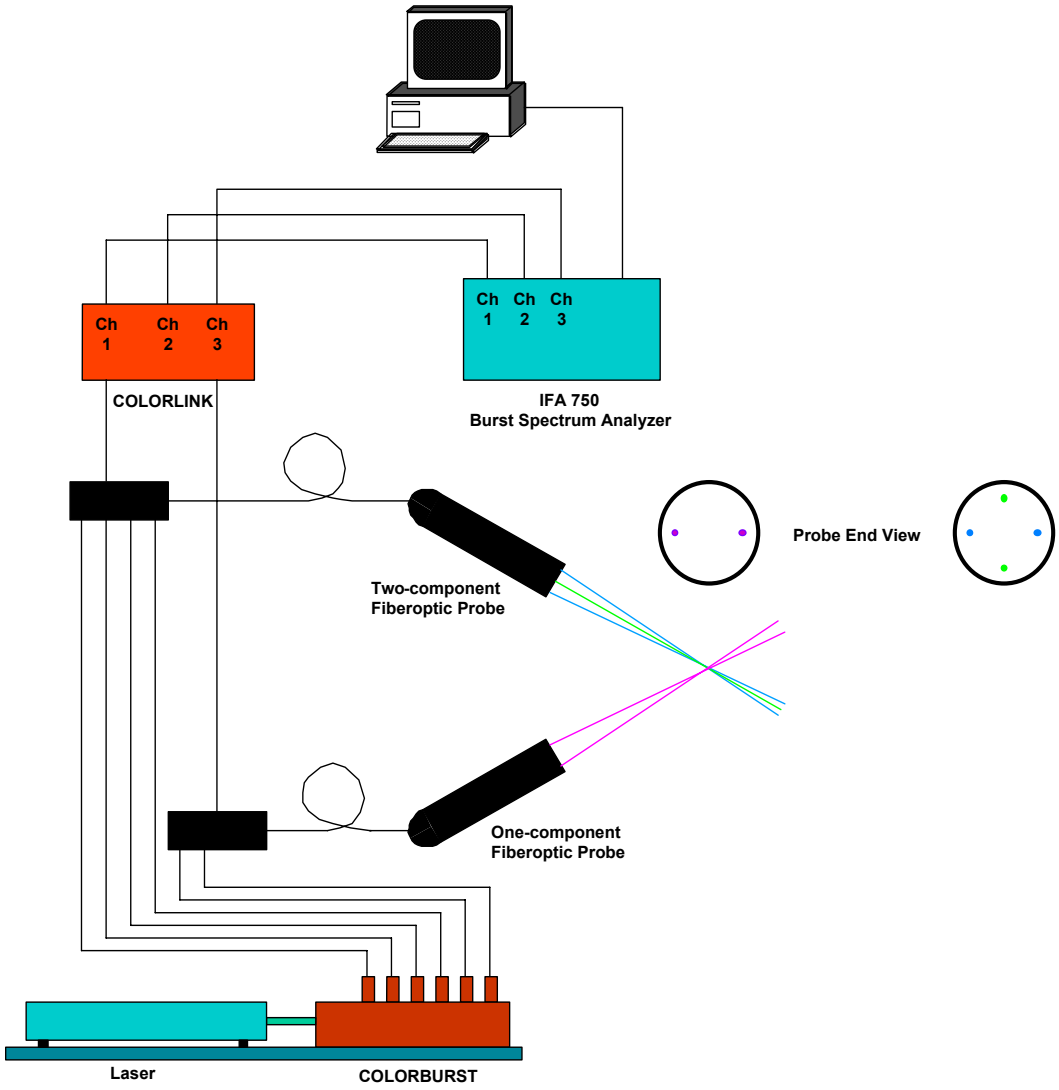


Figure 7. Laser and Optics Schematic

1. Laser and Optics

The 5-Watt Lexel laser was operated in the multi-line mode and was aligned to fire into a beam collimator then directly into a multicolor beam separator. The multicolor beam separator, a TSI model 9201 Colorburst, takes the beam from the laser source and

splits it into two separate beams. One beam is passed through a Bragg cell to allow frequency shifting on that beam. Both beams are then passed through a prism for color separation. The Colorburst produces three pairs of beams: green (514.0 nm), blue (488.0 nm) and violet (476.5 nm). The six beams are then reflected vertically into six fiber-optic couplers. A coupler aligns the laser beam onto the center of a transmitting fiber-optic line and focuses the beam waist at the end of the fiber. There are six transmitting fiber-optic lines in the system. Four are for the two-component and two are for the one-component probe. The probes separate the beams by 50 mm and the final lens focuses the beams of similar colors onto a point at a focal distance of 349.8 mm. The polarization of the six individual laser beams is completed within the probes and they are polarized in the same direction.

2. Data Acquisition

Scattered light from the seed particles is collected by each 83 mm probe and fed back to a TSI Model 9230 Colorlink via a return fiber-optic line. The feedback signal from the one-component probe is sent through a violet filter then to a photomultiplier tube within the Colorlink. The feedback signal from the two-component probe has the green beam separated from it, with a refracting mirror, and that green light goes through a green filter to a photomultiplier tube. The reflected beam is directed through a blue filter to a third photomultipler tube. The Colorlink contains all the components necessary to collect the scattered light and complete the downmixing. The downmixed signals from the Colorlink are sent to the IFA 750 signal processor. The signals are then fed from the IFA 750 to an IBM PC via a multi-channel interface. TSI's PACE 1.4 software is used to process the Doppler signals.

3. Traverse Table

The two fiber-optic probes were mounted on an "I" beam attached to a traverse table that was capable of moving 600 mm in all directions. The PACE 1.4 software, via an RS-232 connection, controlled the traverse table power supply, with digital readout. The table could also be controlled manually.

4. Seeding

The most critical component of the LDV system is particle seeding. The selection of seeding material and location where the seeding particles are injected into the flow must be carefully considered. The seeding particles must be the correct size, usually about 1 μm in order to follow the flow properly, and must be able to scatter the light from the incident laser beam. Seeding location determines the area downstream in the test section that will contain enough seed particles to produce a sufficient data rate for data acquisition. The seeding source, which is usually a wand, must be located far enough upstream so that any flow field interference caused by the wand has time to mix out before the flow enters the test section.

Olive oil was used as the seeding material for the present LDV measurements. The seed particle generator used was a TSI Model 9306 Six-Jet Atomizer modified with a four-wand configuration as shown in Figure 8.

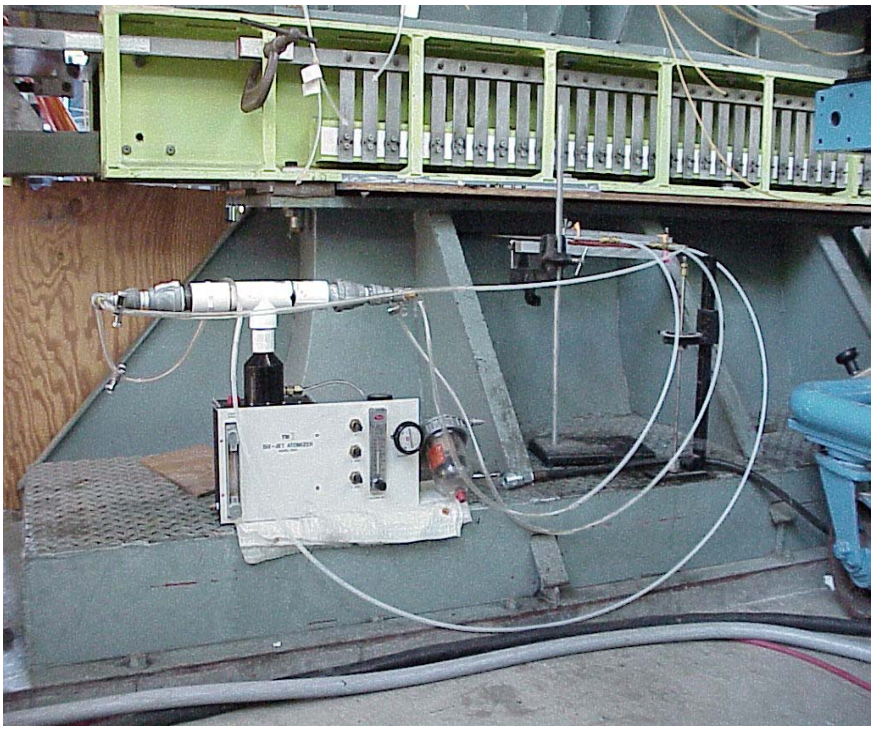


Figure 8. Six-Jet Atomizer and Seeding Wands

The average particle size from the particle generator was 0.9 μm with a standard deviation of 0.45 μm. Seeding material was injected into the flow upstream of the inlet guide vanes. Four seeding wands were used to cover the spanwise depth of the survey from blade 3 to blade 4. The wands could be rotated 360 degrees, which moved the location where the seeding was focused. The wands could also be adjusted in depth from centerline to the north wall. The four adjustable wands provided excellent seeding coverage for the entire survey area. Seeding wand access ports are shown in Figure 9.

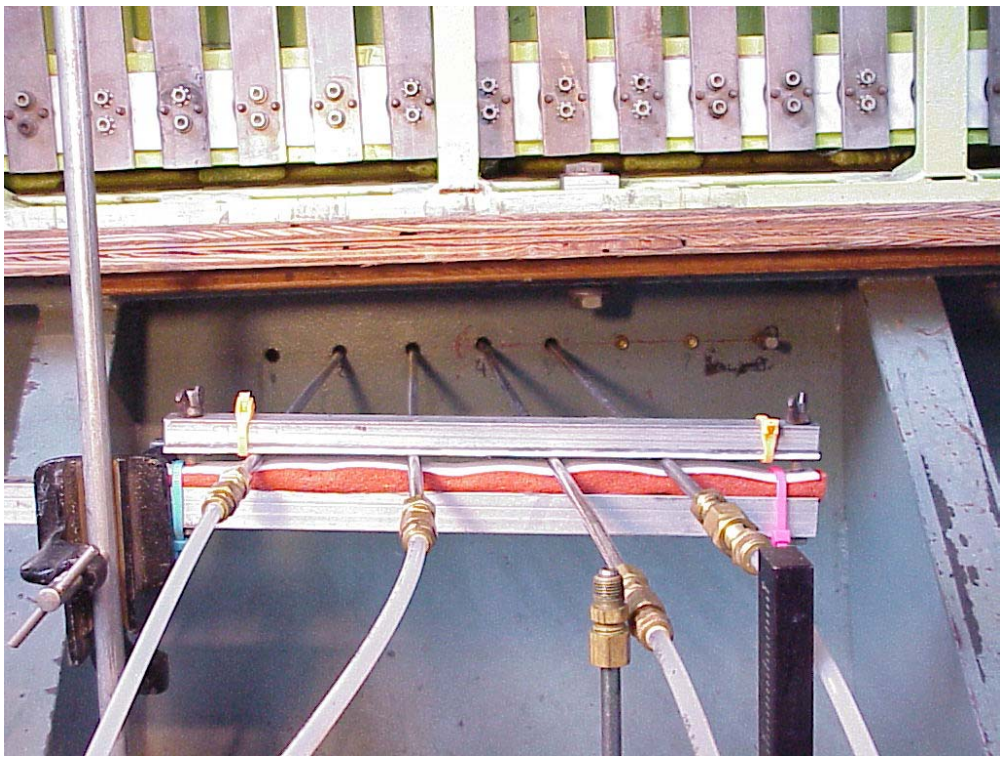


Figure 9. Seeding Wands and Access Ports

III. EXPERIMENTAL PROCEDURES

A. LDV SETUP AND SYSTEM VALIDATION

The LDV components were setup in accordance with the TSI instruction manuals [Ref. 11]. All components, as shown in Figure 6, were capable of being controlled by the user at the computer keyboard. The probe orientation and coordinate system used is the same as Dober [Ref. 9]. Figure 10 shows the probe orientation and coordinate system used for the experiment.

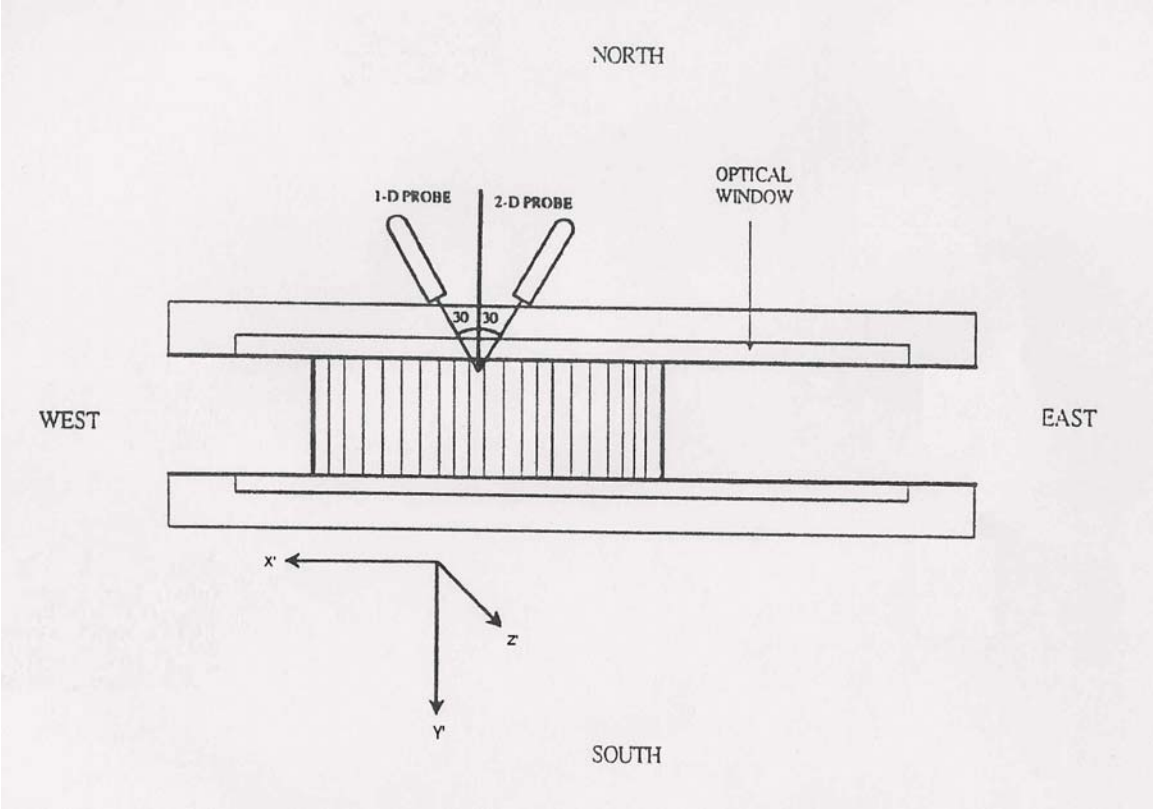


Figure 10. Probe Orientation and Traverse Coordinate System

With the probes properly mounted on the "I" beam and oriented 30 degrees from the perpendicular to the test section window, the beam crossing had to be checked. A minimum of 80% overlap in probe volumes was required for data acquisition in the coincidence mode. To check the beam crossing the microscopic objective was used. First all adjustments to the two-component (green & blue) probe were made and the one-component (violet) probe was turned off. The beams from the two-component probe

were projected into the microscopic objective and the traverse table was moved until the beam crossing point of all four beams was found. The two-component probe was turned off and the one-component probe was then turned on. The two violet beams were adjusted using the one-component probe mount to adjust the focal point of the violet beams, and also to adjust the beam crossing point so that it overlapped the beam crossing point of the blue beams. During this procedure, it was determined that the microscope objective was too deep (tube-like) to accept all six beams crossing through to the focal point. A 0.0762 mm (0.003 in) brass shim-stock, with a 0.3302 mm (0.013 in) hole, was then utilized for probe volume alignment as described above. The shim-stock provided good results for the beam crossing and probe volume alignment. It was then determined that the required 80% overlap was not obtainable with the probe mount adjustment devices on the one-component probe.

The microscope objective was used to determine whether the violet beams were properly aligned with 100% overlap of the violet shifted and unshifted beams. It was determined that there was only 30% to 40% overlap of the one-component violet beams. Beam alignment via internal setscrews in the rear of the one-component probe was required to obtain 100% overlap of the violet probe volumes. Once the violet probe volumes were properly aligned the two-component beam was turned on and all six beams were passed through the shim-stock. At least 80% overlap in probe volumes was obtained, resulting in proper alignment of the system for data acquisition in the coincidence mode.

A coordinate system for the data acquisition was established by hanging an alignment tool on blades three and four. It was the same alignment tool that Hansen [Ref. 3] had built. Figure 11 shows the alignment tool mounted in the test section on blades 3 and 4. The second central hole from the top was modified to allow alignment of the probe volume from probes that are mounted 30 degrees from the perpendicular to the test section window.

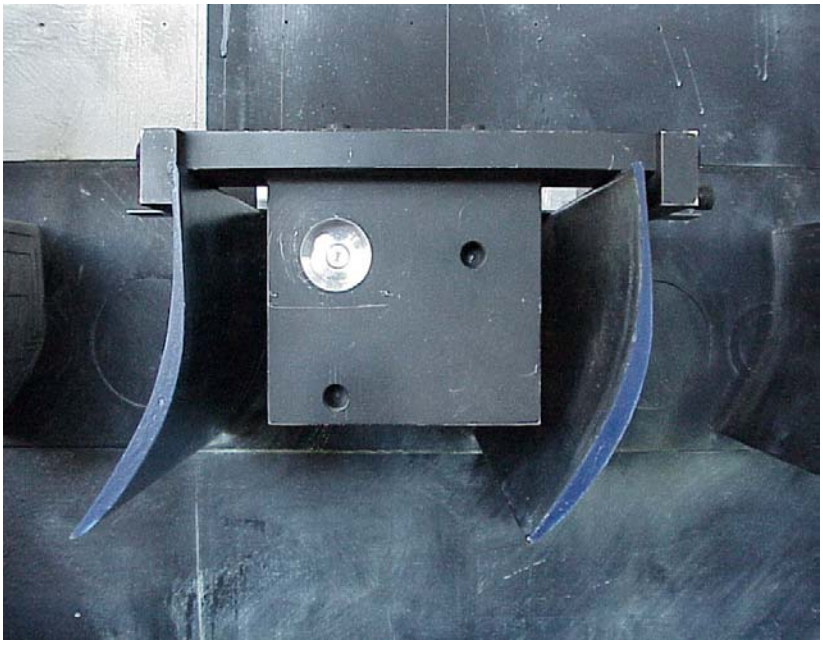


Figure 11. Alignment Tool Mounted in Test Section

The manual traverse control was used to align the probe volume and pass all six beams through the 1.0922 mm (0.043 in) diameter hole. Relative home was then set on the traverse, and the traverse was then moved to the position X'=-87.653 mm, Y'=-52.798 mm and Z'=-93.750 mm. This positioned the probe volume at the tip of the leading edge on the north wall window of blade 3. Relative home was again set on the traverse and this position became the origin of the coordinate system for the surveys conducted in this experiment. Figure 12 shows the blade profile coordinate system, with the origin located at the leading edge and the Y'=0 coordinate being the position where the leading edge of the blade touched the north wall window. Thirteen survey stations were established, which are also shown in Figure 12.

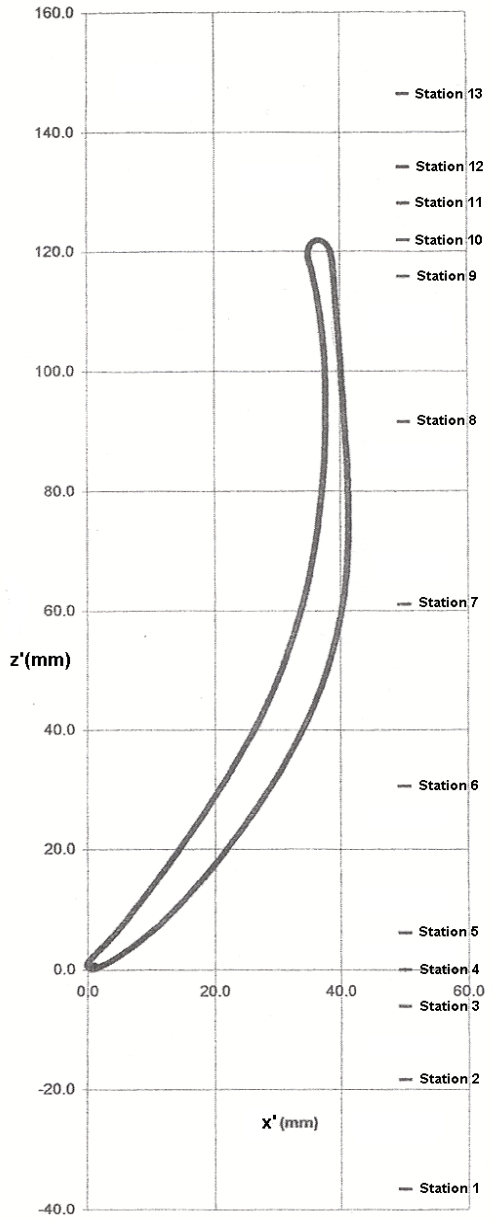


Figure 12. Blade Profile Coordinate System

The stations are represented as a fraction of axial chord (Cac) in Figure 13. The stations defined as a fraction of axial chord were used in the presentation of the experimental results.

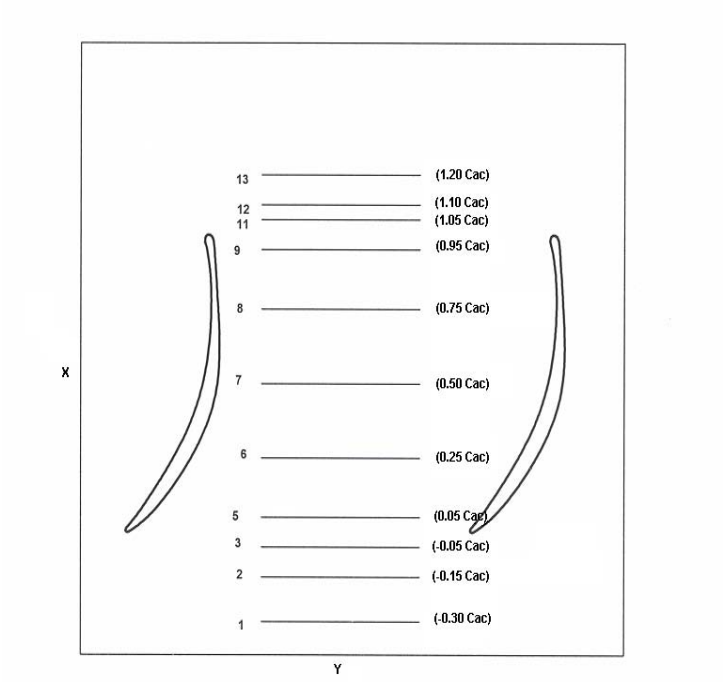


Figure 13. Blade Stations Defined as Percent Axial Chord (Cac)

System validation was completed by a comparison between the three component fiber-optic LDV system and a two component fiber-optic LDV system as described by Carlson [Ref. 7]. The two component system was used by Carlson to collect data at the same point in the flow field. Reasonable agreement was obtained. The present results were within five percent of the measurements that were conducted by Carlson.

B. LDV SURVEYS

Three component LDV surveys were conducted both upstream and downstream of the controlled-diffusion blades. The surveys were a combination of inlet and wake surveys at a tunnel setting corresponding to a Reynolds number of 640,000, with the test-section total pressure held constant at 304.8 mm (12 in.) of water gauge. A single upstream survey was conducted at Station 1, and three downstream surveys were conducted at Stations 11, 12, and 13 respectively. Figure 14 shows each of the survey points on the various grids used to measure the flow field in this experiment.

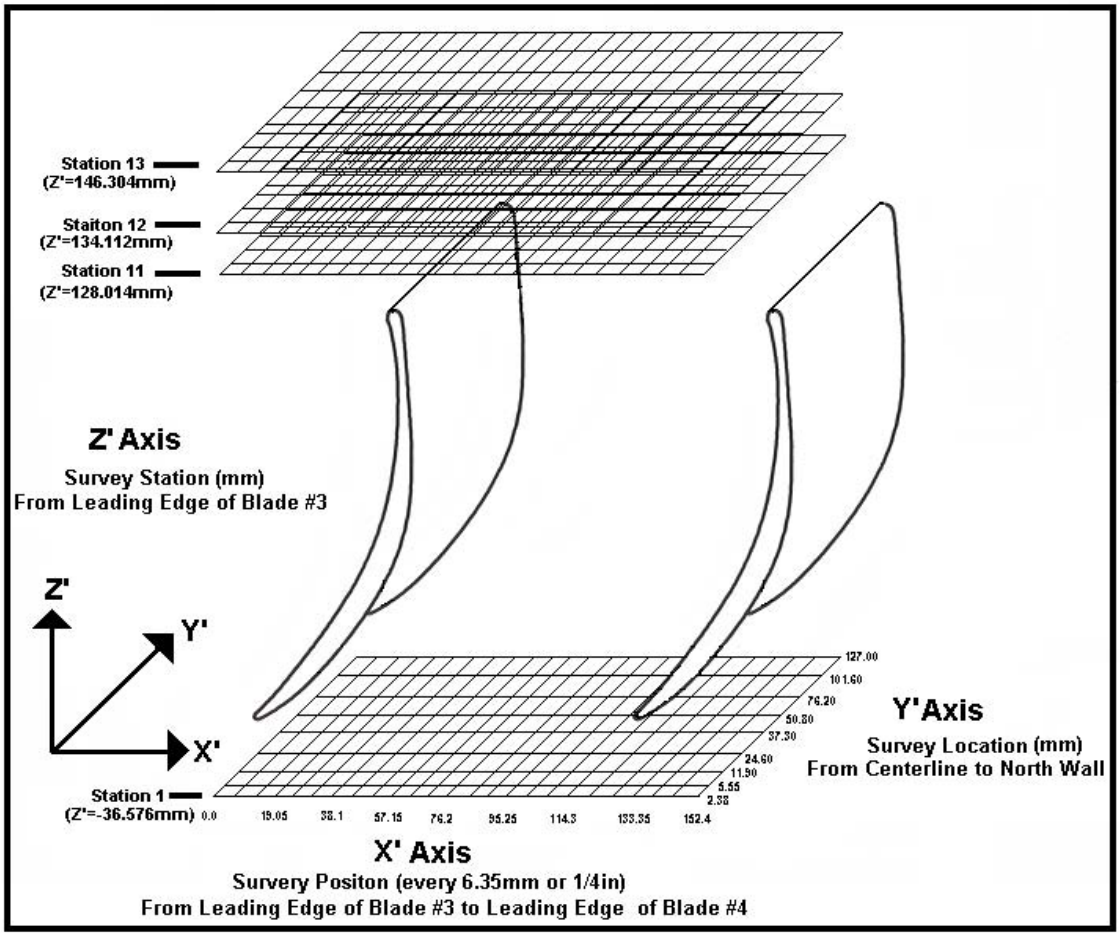


Figure 14. LDV Survey Grids

Each grid extended from the leading edge of blade 3 to the leading edge of blade 4. As established by Carlson [Ref. 7], a survey point along the X'-Axis is referred to as a survey *position*, a survey point along the Y'-Axis is referred to as a survey *location*, a survey point along the Z'-Axis is referred to as a survey s*tation.* Location 1 refers to Y'=127 mm (blade centerline). The flow field at each station was measured at 6.35 mm (1/4 inch) positions starting from blade centerline location and traversing outward towards the north end-wall region, over one complete blade passage.

Data collected by the LDV system included axial, tangential and spanwise flow velocities, turbulence intensities, and Reynolds stresses. The flow angles (α, β, γ) were defined using the magnitude of the mean velocities (u, v, w) in the x, y, and z directions respectively to define a 3-D velocity vector. Figure 15 shows the flow angles defined for the 3-D flow field measurements in the present experiment.

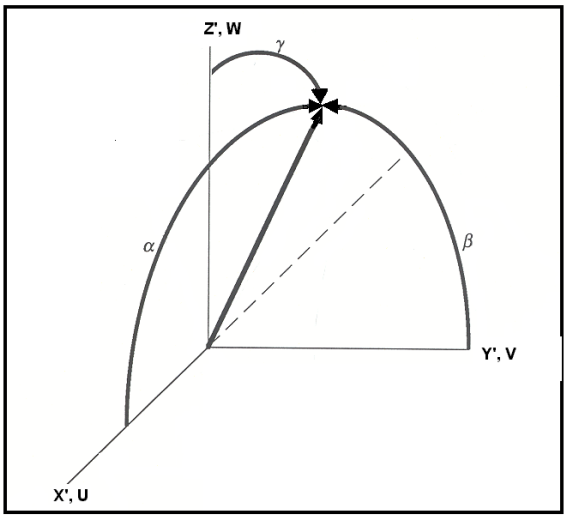


Figure 15. Flow Angles Relative to Traverse Coordinate System

The data collection software package PACE 1.4 was used for the present study. PACE 1.4 is a TSI Windows-based software package specifically designed for LDV systems. All surveys were conducted with the laser power output set to 1.5 Watts, coincidence mode selected and 1000 data points were used for each histogram. The only variations in data collection from the inlet survey to the wake surveys were the processor control settings for frequency range, and frequency shifting.

One inlet flow survey was conducted at station 1. Colorlink frequency shifting of 1 MHz was set for all three channels.

Wake surveys were conducted at stations 11, 12 and 13. Colorlink frequency shifting for channel 1 was set to 5 MHz, and channels 2 and 3 were set to 10 MHz w/23 MHz low pass filter.

In order to obtain optimal results for each survey the following procedure was followed: Prior to a station survey all six beams were optimized for power setting and alignment. This procedure is outlined in the TSI instruction manual [Ref. 11]. The test section window was cleaned. The window was properly installed paying close attention to the setscrews. Over tightening or misaligned setscrews could result in window warping and poor data collection. The seeding atomizer provided sufficient seeding when set to 40psi. As the survey began at the leading edge of blade 3 and traversed in position along the X'-axis, seeding wands 3 and 4 were clamped off until the survey was half way between blades 3 and 4, then wands 3 and 4 were opened and wands 1 and 2 were clamped off. As the surveys began at the centerline location along the Y'-axis, with subsequent ones closer to the north wall, the seeding wands had to be pulled toward the north wall. This resulted in excess seeding oil collecting on the inside of the test section window, which resulted in poor data collection. The window was cleaned frequently during the survey, using a broomstick with a clean rag attached to the end to wipe the inside of the window from the top (exhaust section) of the wind tunnel.

C. LDV DATA PROCESSING

Ambient pressure, plenum total pressure and plenum total temperature were recorded for each survey. The velocity at the inlet of the test section was measured for each survey and used as the reference velocity, V_{ref}, for purposes of non-dimensionalizing the data. A FORTRAN code, CALIB1 [Ref. 3], was used to calculate V_{ref} for each survey using atmospheric pressure, plenum total pressure and plenum total temperature. A summary of V_{ref} input and output data files for each survey is listed in Appendix A. All data were processed using TSI PACE 1.4 software, and each survey was non-dimensionalized using V_{ref} for that survey. This allowed surveys conducted under different atmospheric conditions to be compared.

The PACE 1.4 software required a transformation matrix to be applied to the data for the two-probe arrangement. The two components of velocity measured in a plane were resolved to get u_x and u_y values. The optical axes of the blue and violet beams

were used to measure the two components of velocity in the same plane as shown in Figure 16.

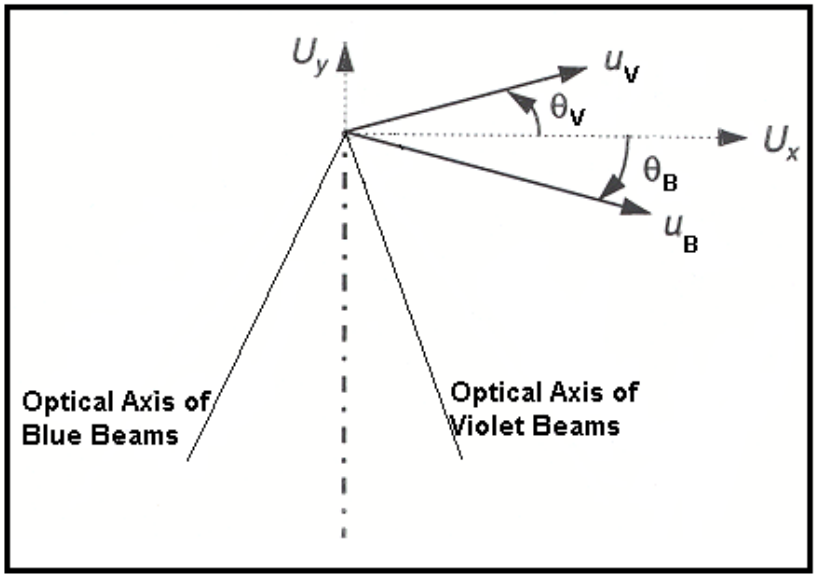


Figure 16. Two-Probe Arrangement: Green and Violet Beams in Ux-Uy Plane

The green pair of beams measured the component of velocity Uz out of the plane of the paper and the blue and violet pair of beams measured the two non-orthogonal components u_b and u_v of velocity. From these, the values of u_x and u_y were obtained using Equation (1),

$$\begin{bmatrix} u_x \\ u_y \\ u_z \end{bmatrix} = \begin{bmatrix} 0 & a_1 & b_1 \\ 0 & c_1 & d_1 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} u_g \\ u_b \\ u_v \end{bmatrix} \qquad (1)$$

where,

$$a_1 = \frac{\sin\theta_b}{\sin(\theta_v + \theta_b)},\ b_1 = \frac{\sin\theta_v}{\sin(\theta_v + \theta_b)}$$

$$c_1 = \frac{\cos\theta_b}{\sin(\theta_v + \theta_b)},\ d_1 = \frac{-\cos\theta_v}{\sin(\theta_v + \theta_b)}$$

From the values obtained in Equation (1) the coordinate transformation matrix used in this experiment for all data processed with PACE 1.4 software was

$$\begin{bmatrix} u_x \\ u_y \\ u_z \end{bmatrix} = \begin{bmatrix} 0 & 0.57735 & 0.57735 \\ 0 & 1 & -1 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} u_g \\ u_b \\ u_v \end{bmatrix}$$

The processed data from PACE 1.4 was formatted in Excel spreadsheets. The spreadsheets were reduced and organized by station and location. For each flow field coordinate non-dimensional velocity, turbulence intensities, Reynolds stress, correlation coefficients, total velocity and flow angles were determined. Appendix B contains the tabulated data for stations 1, 11, 12 and 13 respectively.

IV. RESULTS AND DISCUSSION

A. INLET SURVEY

Three-dimensional LDV measurements upstream of the test section were performed at Station 1 to characterize test section inlet flow conditions. Station 1 was located upstream of the test section at 30% axial chord ($0.30c_{ac}$). Results at Station 1 for the velocity (referenced to inlet reference velocity, V_{ref}), turbulence intensities, Reynolds stress and correlation coefficients are tabulated in Appendix B. The results show nearly uniform velocity ratios $U/V_{ref,}$ $V/V_{ref,}$ $W/V_{ref.}$ The turbulence intensities ranged from 1.5%-3.0% near the centerline of the blades and increased as the survey approached the end-wall region, ranging from 2.9%-5.6%. The Reynolds stress correlation coefficients remained below 0.1 for all locations, showing the flow to be random or uncorrelated.

Station 1 velocity profiles ($U_{tot}/V_{ref,}$) for each location from centerline to end wall are plotted in Appendix C. Along the centerline (location 1), three distinct dips in velocity occur at y/S positions of 0.2, 0.4 and 0.6 causing wave-like features in the flow. The wave-like features of the velocity ratios correspond to the spacing of the inlet guide vanes. In comparison, the results of the 2-D LDV surveys conducted by Carlson [Ref. 7], do not show the three distinct dips along the centerline but do show them at all the other locations at Station 1. It is concluded that seeding mechanism was the probable cause for Carlson's centerline survey not showing the three distinct dips. He used a single rotatable seeding wand to perform his centerline survey while, in the present study, an array of seeding wands was used.

A surface plot of the non-dimensionalized velocity (U_{tot}/V_{ref}) from centerline (z/h=0) to the end-wall region was generated and is shown in Figure 17 as a summary of all Station 1 surveys. The plot was generated using the MATLAB code presented in Appendix D. As expected, the plot shows a fairly uniform velocity profile; however, the wavelike features can be seen corresponding to the spacing of the inlet guide vanes. The extent of the boundary layer can also be seen at z/h = -0.42. This data can be compared to the five-hole probe data produced in a graduate laboratory course, AA3802 Term

Project [Ref. 8]. The non-dimensional velocity X is presented in Figure 18 and the tabulated data from AA3802 Term Project are presented in Appendix E. The five-hole probe survey was conducted further upstream than Station 1, (at 1.8 Cac), therefore the effects of the inlet guide vanes become more apparent and the boundary layer is more clearly defined.

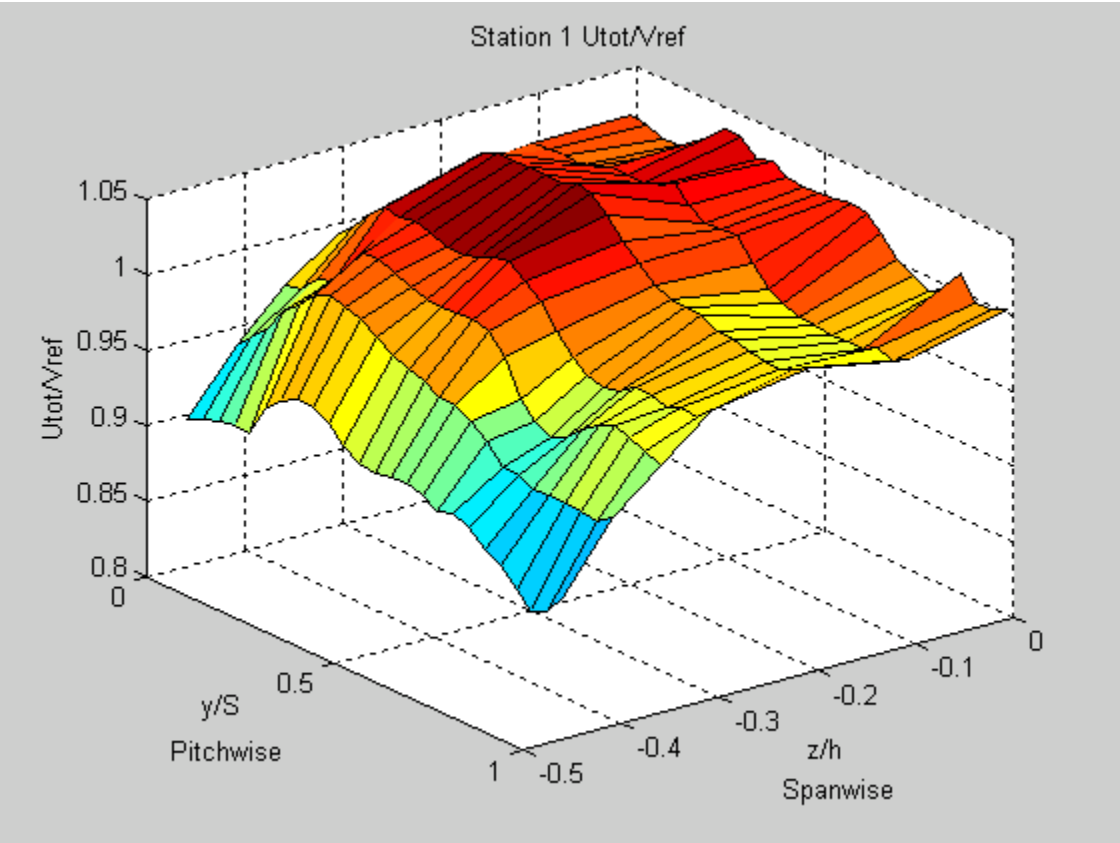


Figure 17. Station 1 Surface Plot of Non-Dimensional Velocity (Utot/Vref)

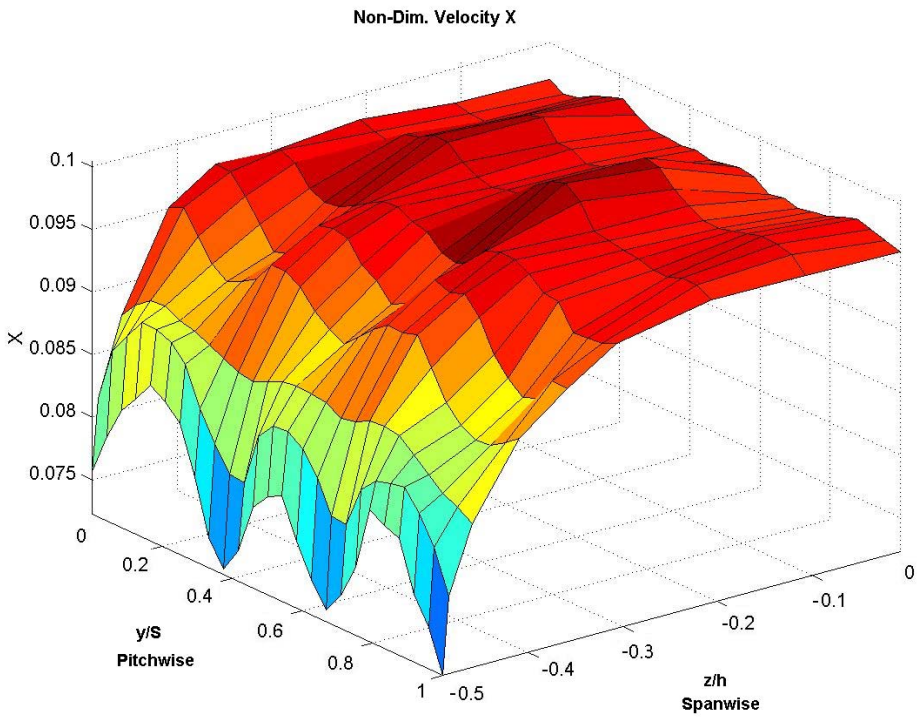


Figure 18. Non-Dimensional Velocity; Five-Hole Probe Data

A surface plot of non-dimensional turbulence kinetic energy ($k/Vref^2$) from centerline (z/h=0) to the end-wall region was generated and is shown in Figure 19 as a summary of all Station 1 locations. The plot was also generated using the MATLAB code presented in Appendix D. As expected the plot shows a fairly uniform turbulence profile with the wave-like features corresponding to the spacing of the inlet guide vanes, which are more clearly defined. An average non-dimensionalized total turbulence kinetic energy value of ($k/Vref^2$) = 8 is evident in the free stream. The turbulence kinetic energy increases as the end-wall boundary layer is approached to an average value of ($k/Vref^2$) = 19, and a maximum value of ($k/Vref^2$) = 30 is observed at the end-wall region in the wake of each inlet guide vane.

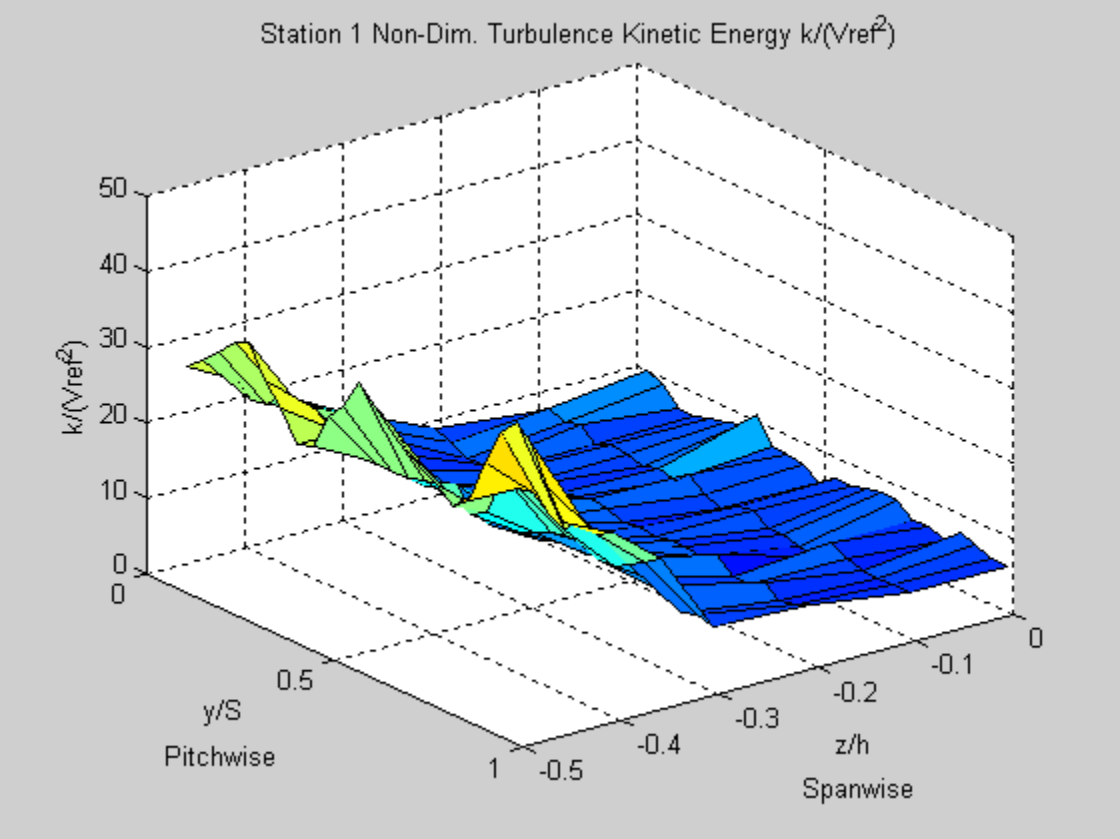


Figure 19. Station 1 Non-Dimensional Turbulence Kinetic Energy k/(Vref^2)

The level of turbulence increases at a z/h of approximately -0.3 towards the north wall (z/h=-0.5), indicating the extent of the incoming end-wall boundary layer, ($\delta \approx 0.2\, z/h$).

B. WAKE SURVEYS

Wake surveys were performed at Stations 11, 12, and 13. Station 11, 12 and 13 were located downstream of the test section at 105% ($1.05c_{ac}$), 110% ($1.10c_{ac}$), 120% ($1.20c_{ac}$) axial chord respectively. Results at each station for the velocity (referenced to inlet velocity condition, V_{ref}), turbulence intensities, Reynolds stress and correlation coefficients, are tabulated in Appendix B. The velocity profiles (U_{tot}/V_{ref}) at Station 13, at each location from the centerline to the end wall, are plotted in Appendix C. The velocity profiles were relatively uniform in the free stream, with depressions in the vicinity of the blade trailing edge position.

The turbulence intensities for all three downstream stations ranged from 1.5%-24% near the centerline of the blades and increased as the survey approached the north wall to a range from 3.5%-18%.

A surface plot of the non-dimensionalized velocity (U_{tot}/V_{ref}) from the centerline (z/h=0) to the end-wall region was generated, at each station, for all locations from the centerline the to end-wall region. The plot(s) for each station are presented and discussed below.

1. Station 11

Station 11 survey results are shown tabulated in Appendix B. The entire flow field survey could not be completed. As the probe volume traversed closer to the north wall the Colorlink experienced over saturation and therefore could not collect data in coincidence mode. For those data points which were incomplete, thus resulting in unreasonably high values, the non-dimensionalized velocity values (U_{tot}/V_{ref}) were set to one and all other entries on the table were set to zero.

In the free stream region, the turbulence intensity remained nearly uniform until the wake was reached, at which point it began to increase at the trailing edge of the blades, with a maximum value of 24%. The wake turbulence also showed two distinct peaks as the wake was traversed. A surface plot of non-dimensional turbulence kinetic energy ($k/Vref^2$) is not presented because of the number of incomplete data points, as discussed above. The correlation coefficient started at a magnitude of 0.2 and became -0.2 as the wake was traversed, and returned to a value of 0.1.

A surface plot of Station 11 non-dimensionalized velocity (U_{tot}/V_{ref}), from centerline (z/h=0) to the end-wall region, was generated, and is shown in Figure 20. The plot is not smooth due to the minimal number of data points collected from the nine irregularly spaced spanwise surveys. The surface plot clearly shows the drop in velocity as the wake is approached, and increasing in complexity as the end-wall region is approached.

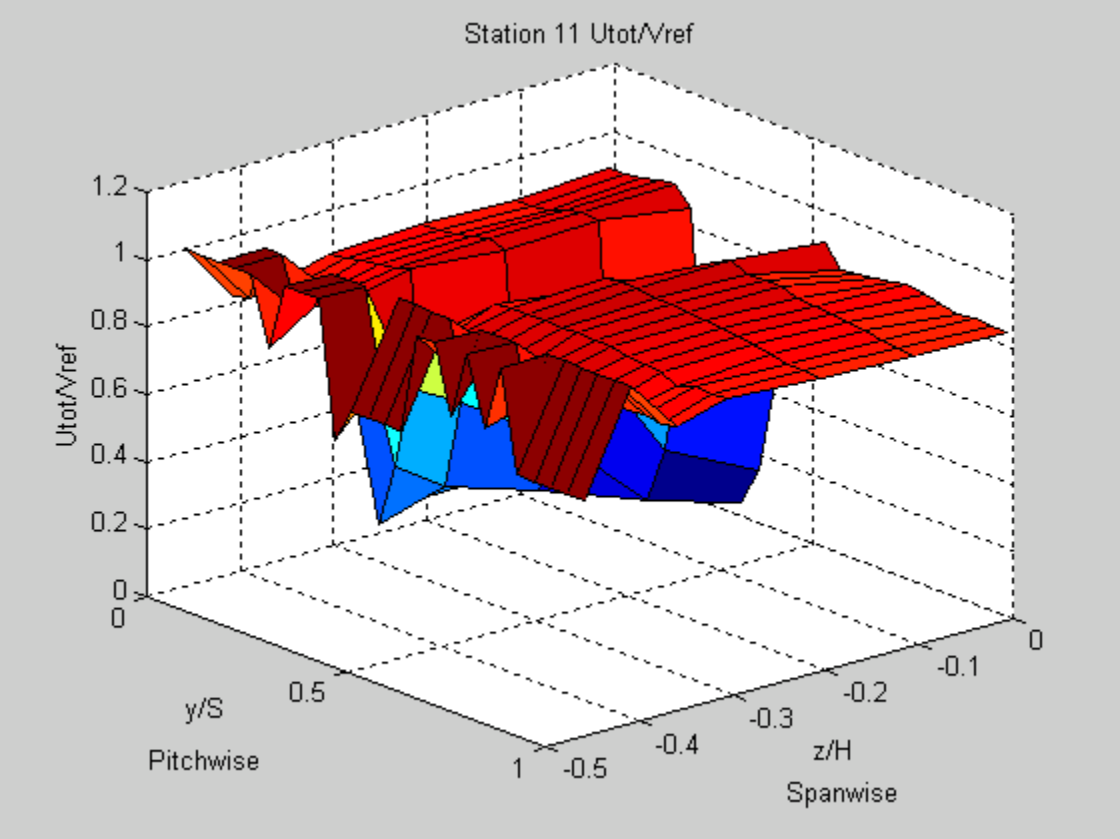


Figure 20. Station 11 Surface Plot of Non-Dimensional Velocity (Utot/Vref)

Figure 21 shows Station 11 non-dimensional pitchwise velocity vectors over plotted as a contour plot of the total velocity. Although some data points were incomplete as described above, Figure 21 clearly shows a secondary flow present within the wake. The secondary flow can be seen at y/S=0.45, z/h=-0.325, and also at y/S=0.2, z/h=-0.35. It can also be seen that, close to the end wall, the velocity trough shrinks due to the interference with the end-wall corner vortices. The end-wall boundary layer may also be a cause for the shrinking of the velocity trough, combined with the secondary flow effects.

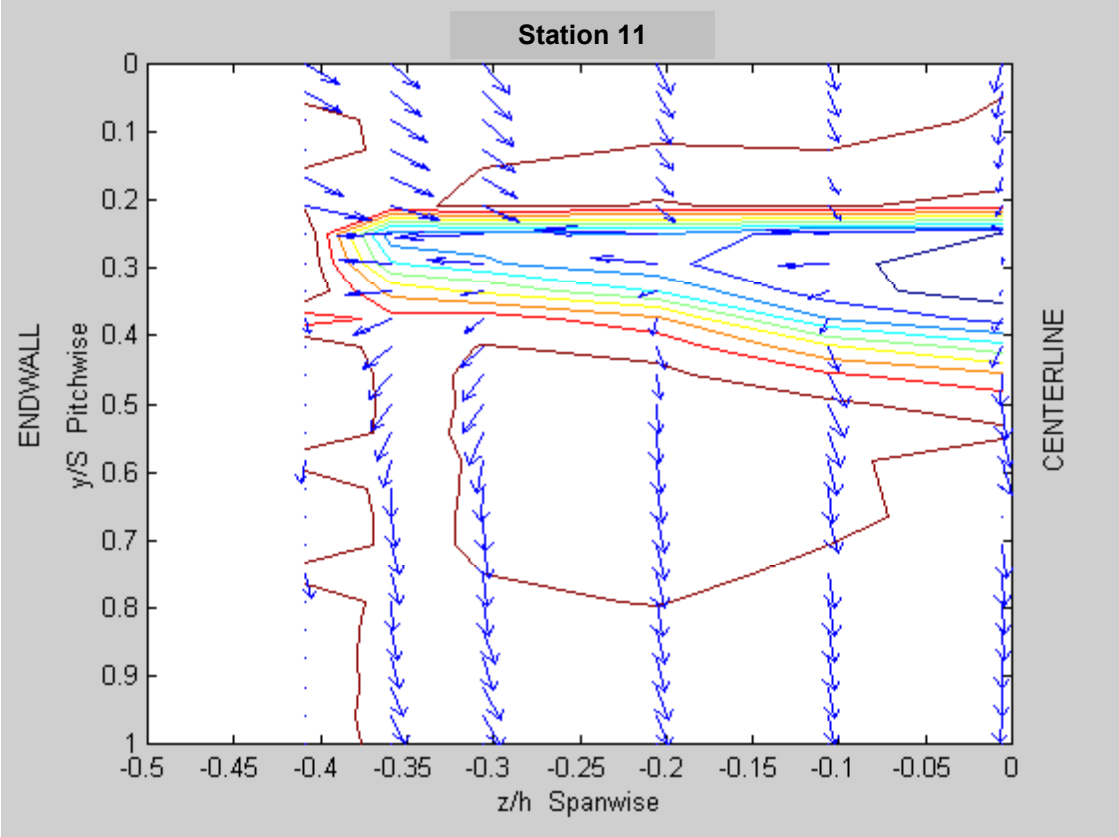


Figure 21. Station 11 Total Velocity Contour and Vector Plot of Pitchwise Velocity

2. Station 12

Station 12 survey results are shown tabulated in Appendix B. The entire flow field survey could not be completed; as the probe volume traversed closer to the north wall test section window, the Colorlink experienced over saturation and therefore could not collect data in the coincidence mode. The turbulence intensity remained nearly uniform until the wake was reached, at which point it began to increase at the trailing edge of the blades, with a maximum value of 24%. The wake turbulence also showed two distinct peaks as the wake was traversed. The correlation coefficient started at a magnitude of 0.2 and became -0.2 as the wake was traversed, and returned to a value of 0.1.

A surface plot of Station 12 non-dimensionalized velocity (U_{tot}/V_{ref}), from centerline (z/h=0) to the end-wall region, was generated, and is shown in Figure 22. The surface plot clearly shows the drop in velocity as the wake is approached, becoming more

complex as the end-wall region is approached. It also shows a widening in the wake area of reduced velocity as compared to Station 11 (Fig. 20), indicating the diffusion of the wake.

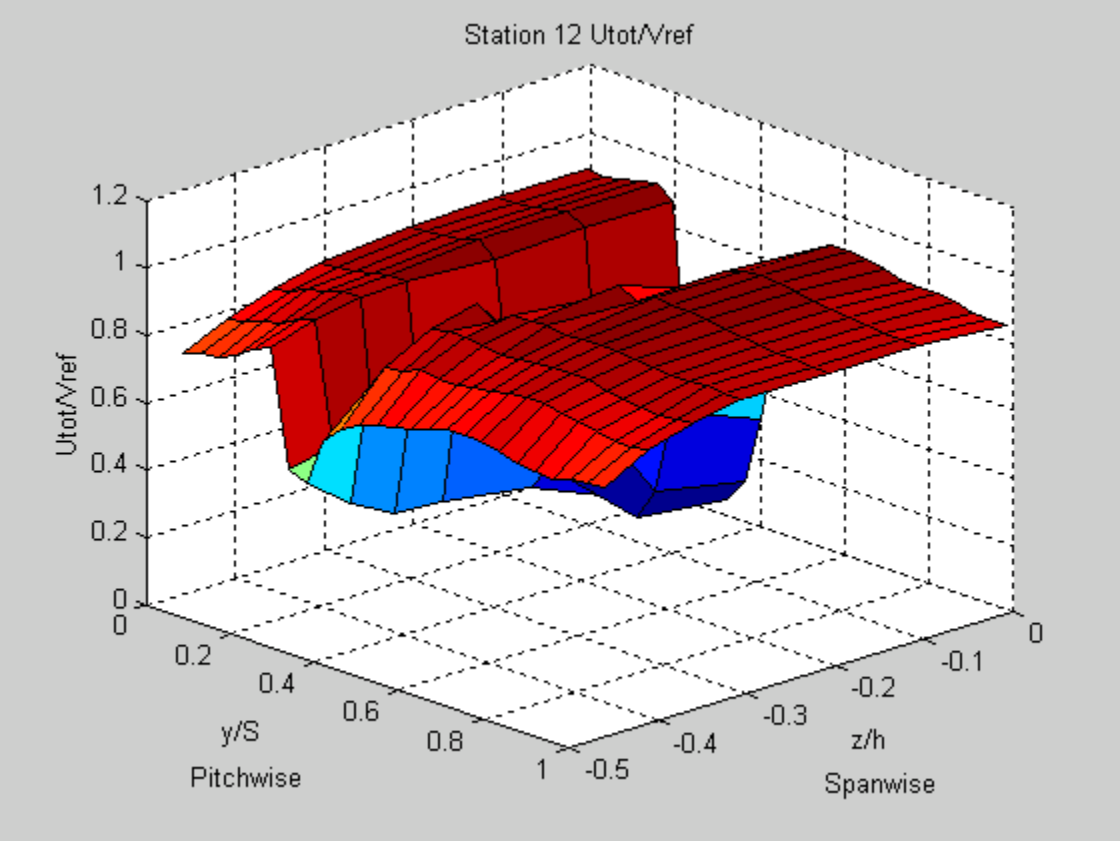


Figure 22. Station 12 Surface Plot of Non-Dimensional Velocity (Utot/Vref)

Figure 23 shows Station 12 non-dimensional pitchwise velocity vectors over plotted on a contour plot of the total velocity. Although some data points were incomplete, as described above, Figure 23 shows a secondary flow to be present and more clearly defined within the wake. The secondary flow can be seen at y/S=0.15, z/h=0.35 and y/S=0.45, z/h=0.35. As indicated by the contours, the velocity trough is wider at the centerline (free stream) and is shrunk or "squeezed" together by the effects of the secondary flow, and possibly end-wall boundary layer effects.

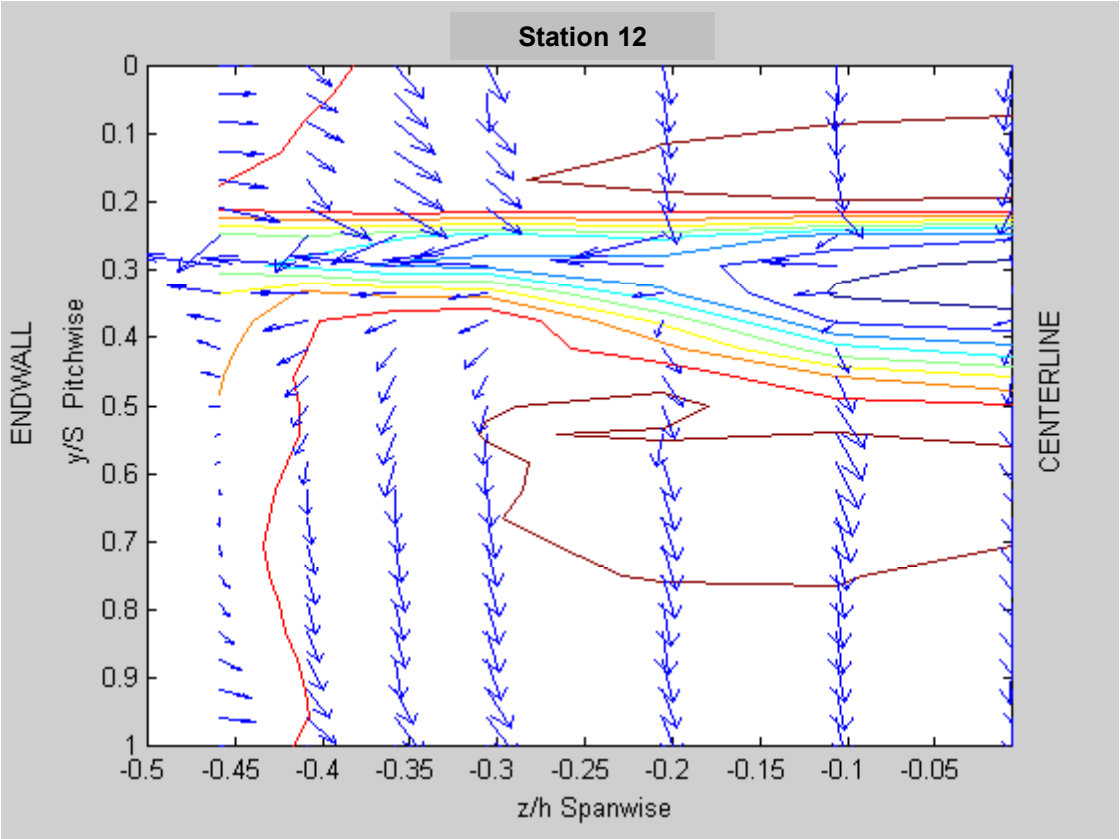


Figure 23. Station 12 Total Velocity Contour and Vector Plot of Pitchwise Velocity

A surface plot of non-dimensional turbulence kinetic energy ($k/Vref^2$), from the centerline (z/h=0) to the end-wall region, was generated, and is shown in Figure 24 as a summary of all Station 12 locations. An average non-dimensionalized total turbulence kinetic energy value of ($k/Vref^2$) = 9 is evident in the free stream. The turbulence kinetic energy increases as the end-wall boundary layer is approached to an average value of ($k/Vref^2$) = 35, and a maximum value of ($k/Vref^2$) = 582 is observed in the wake of blade

3 along the centerline location. The non-dimensional turbulence kinetic energy ($k/Vref^2$) in the wake also showed two distinct peaks as the wake was traversed.

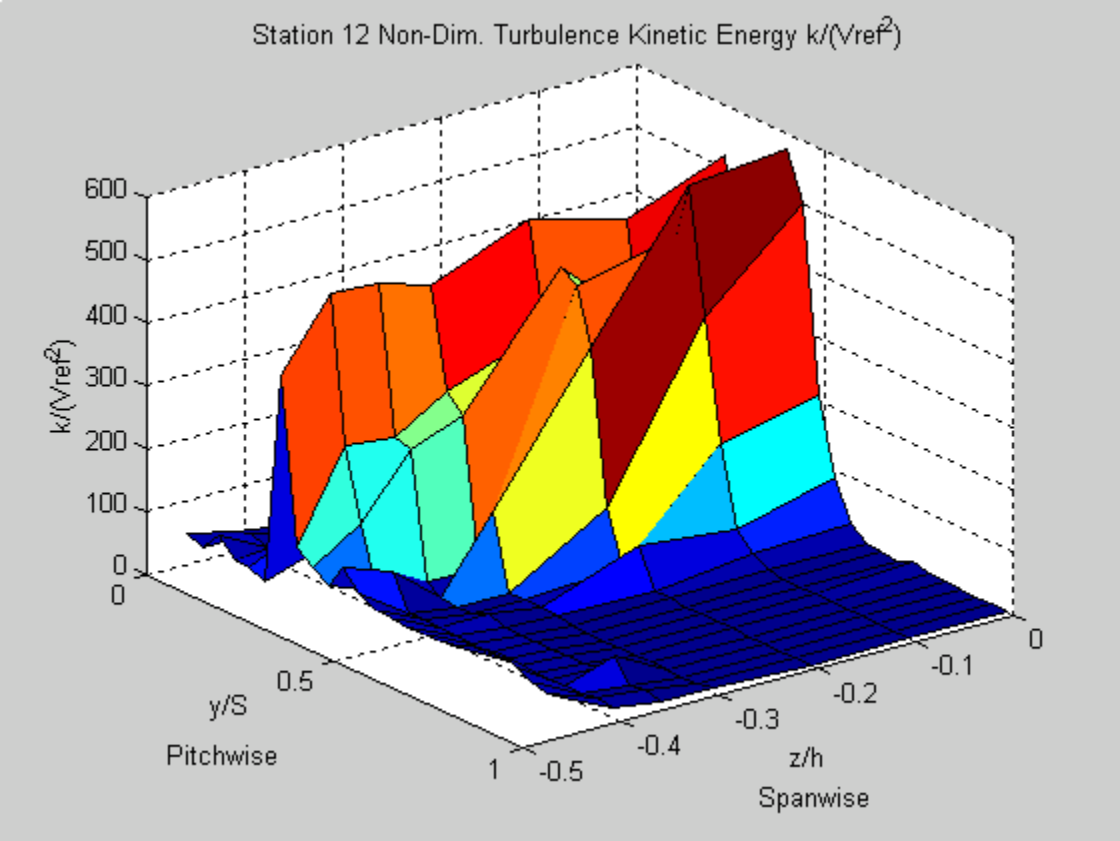


Figure 24. Station 12 Non-Dimensional Turbulence Kinetic Energy k/(Vref^2)

3. Station 13

Station 13 survey results are shown tabulated in Appendix B. The entire flow field survey was completed, except for location 9 due to Colorlink saturation. In the free stream, the velocity profiles indicated a minimum at the trailing edge of each blade. The turbulence intensity remained nearly uniform until the wake was reached, at which point it began to increase at the trailing edge of the blades, with a maximum value of 23%. The wake turbulence also showed two distinct peaks as the wake was traversed. The correlation coefficient started at a magnitude of nearly 0 and became 0.1 as the wake was traversed, and returned to a value of zero.

A surface plot of Station 13 non-dimensionalized velocity (U_{tot}/V_{ref}), from the centerline (z/h=0) to the end-wall region, was generated, and is shown in Figure 25. The surface plot clearly shows the drop in velocity as the wake is approached, becoming more complex as the end wall is approached. It also shows a widening of the area of reduced velocity, as compared to Stations 11 and 12 (Figures 21 and 22 respectively), indicating the diffusion of the wake.

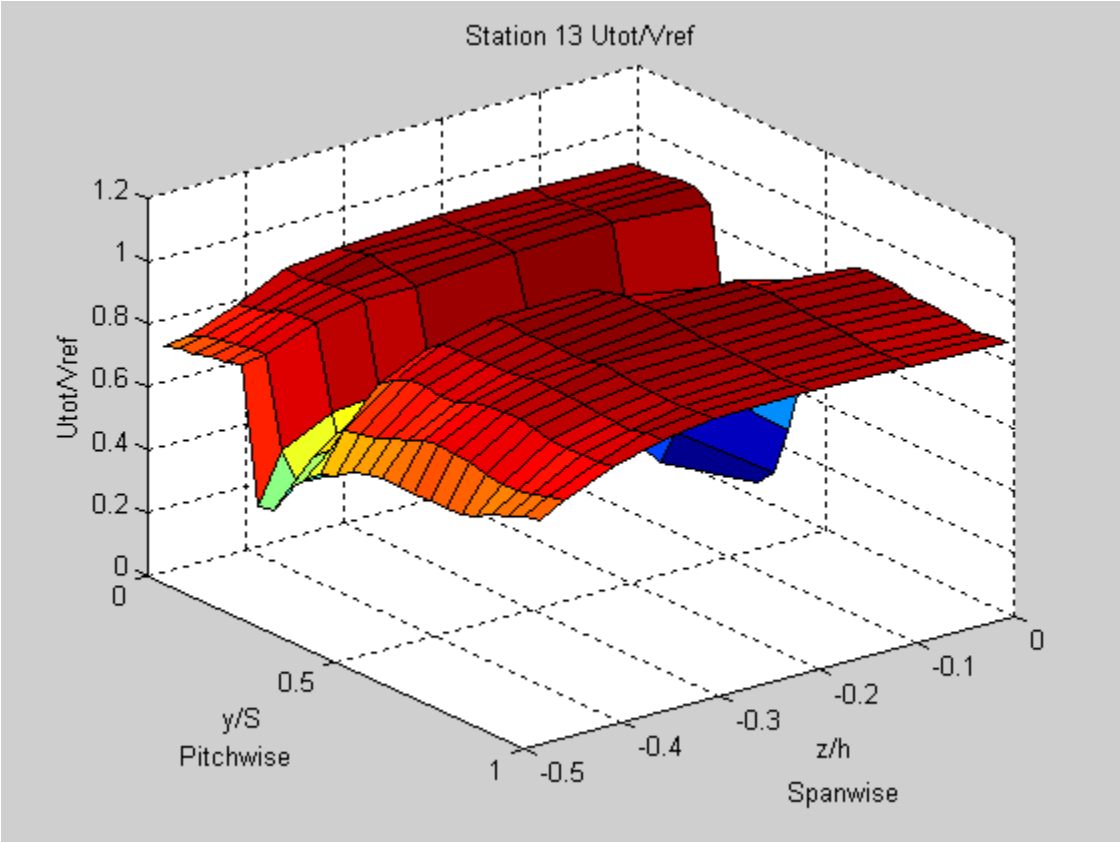


Figure 25. Station 13 Surface Plot of Non-Dimensional Velocity (Utot/Vref)

Figure 26 shows Station 13 non-dimensional pitchwise velocity vectors over plotted on a contour plot of the total velocity. Figure 26 more clearly defines the secondary flow present within the wake. The secondary flow can be seen at y/S=0.4, z/h=-0.4. Again the velocity trough is wider at the centerline location, and is "squeezed" by the secondary flow and the boundary layer as the flow field approaches the north end-wall region. The downstream vortices result from the interaction between the end-wall boundary layer and the blade tips. The end-wall boundary layer flow approaching the

leading edge of each blade in the cascade separates and rolls up into the familiar horseshoe vortex found around all blunt obstacles standing out of a shear flow. The leg of the vortex on the suction side is moved spanwise away from the end wall by the secondary flow in the passage. The leg of the vortex on the pressure side is convected across the passage, to join the suction surface of an adjacent blade, so that the end wall suction surface corner has two vortices rotating in opposite directions, as seen in Figure 26.

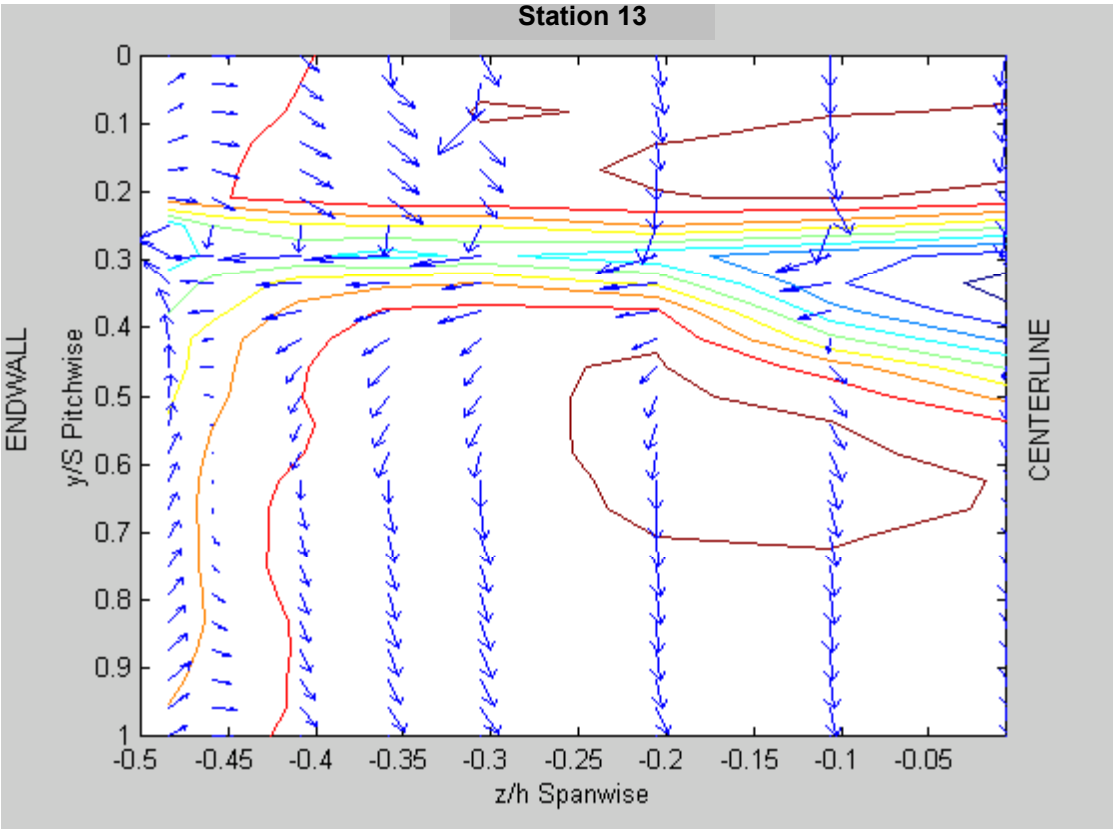


Figure 26. Station 13 Total Velocity Contour and Vector Plot of Pitchwise Velocity.

A surface plot of non-dimensional turbulence kinetic energy ($k/Vref^2$), from the centerline (z/h=0) to the end-wall region, was generated, and is shown in Figure 27 as a summary of all Station 13 locations. An average non-dimensionalized total turbulence kinetic energy value of ($k/Vref^2$) = 9 is evident in the free stream. The turbulence kinetic energy increases as the end-wall boundary layer is approached, to an average value of ($k/Vref^2$) = 48 and a maximum value of ($k/Vref^2$) = 556 is observed in the wake of blade

3 along the centerline location. The non-dimensional turbulence kinetic energy ($k/Vref^2$) in the wake also showed two distinct peaks as the wake was traversed.

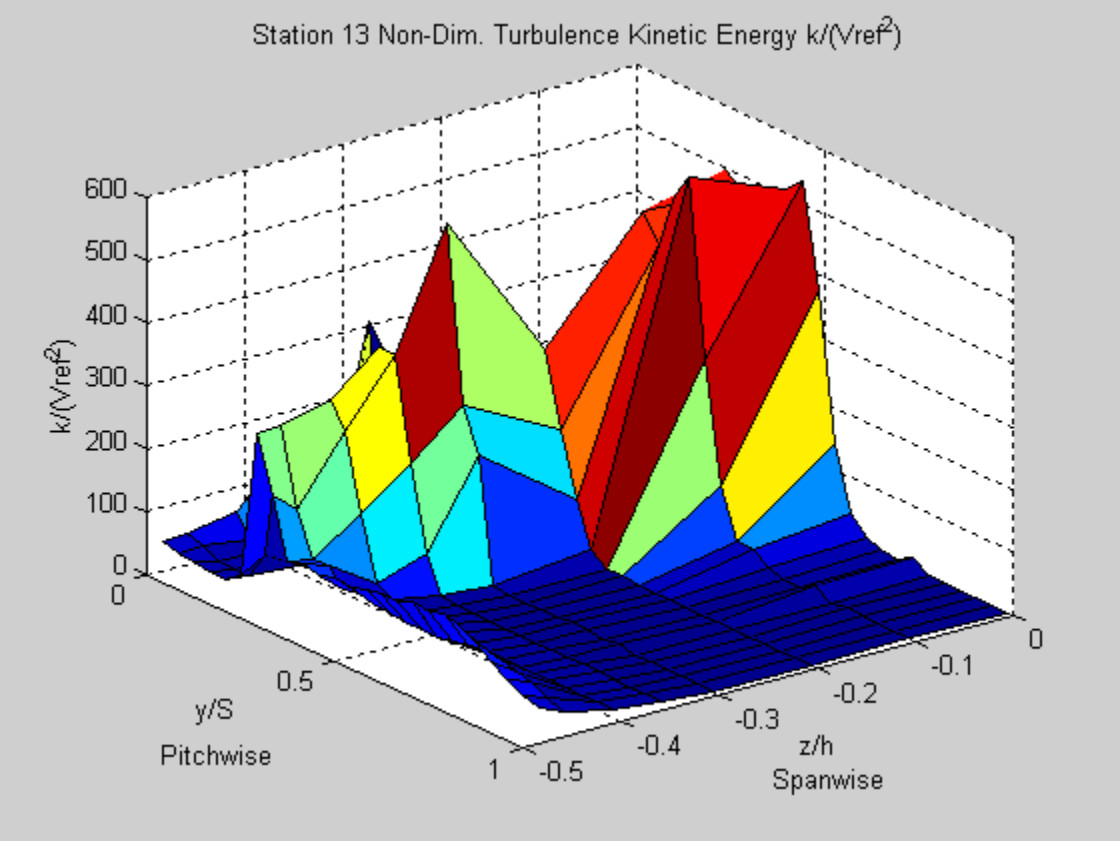


Figure 27. Station 13 Non-Dimensional Turbulence Kinetic Energy k/(Vref^2)

C. WAKE SURVEYS SUMMARY

Stations 11, 12 and 13 summary plots were combined, for each station, and are presented here as Figures 28, 29 and 30 respectively. The presentation of these figures enables the reader to clearly visualize the resulting downstream flow field. The gradual progression of the secondary flow field can be seen starting at Station 11 (Fig. 28), where the velocity trough is very narrow, and the largest difference in velocity from free stream to wake is experienced here. Station 12 (Fig. 29) shows a wider velocity trough, and shows a more developed secondary flow field. Station 13 (Fig. 30) clearly shows the secondary flow, and indicates the least difference in velocity from free stream to wake.

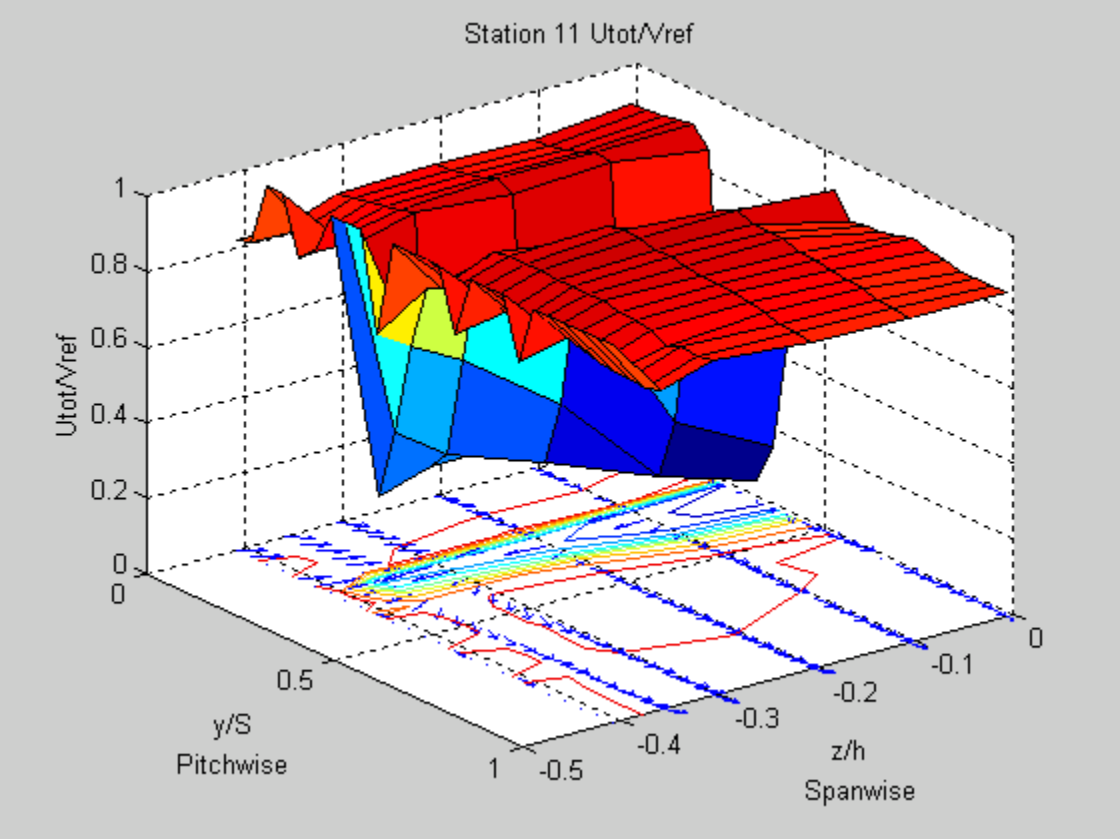


Figure 28. Station 11 Summary Surface, Vector and Contour Plot of Non-Dimensional Velocity (Utot/Vref)

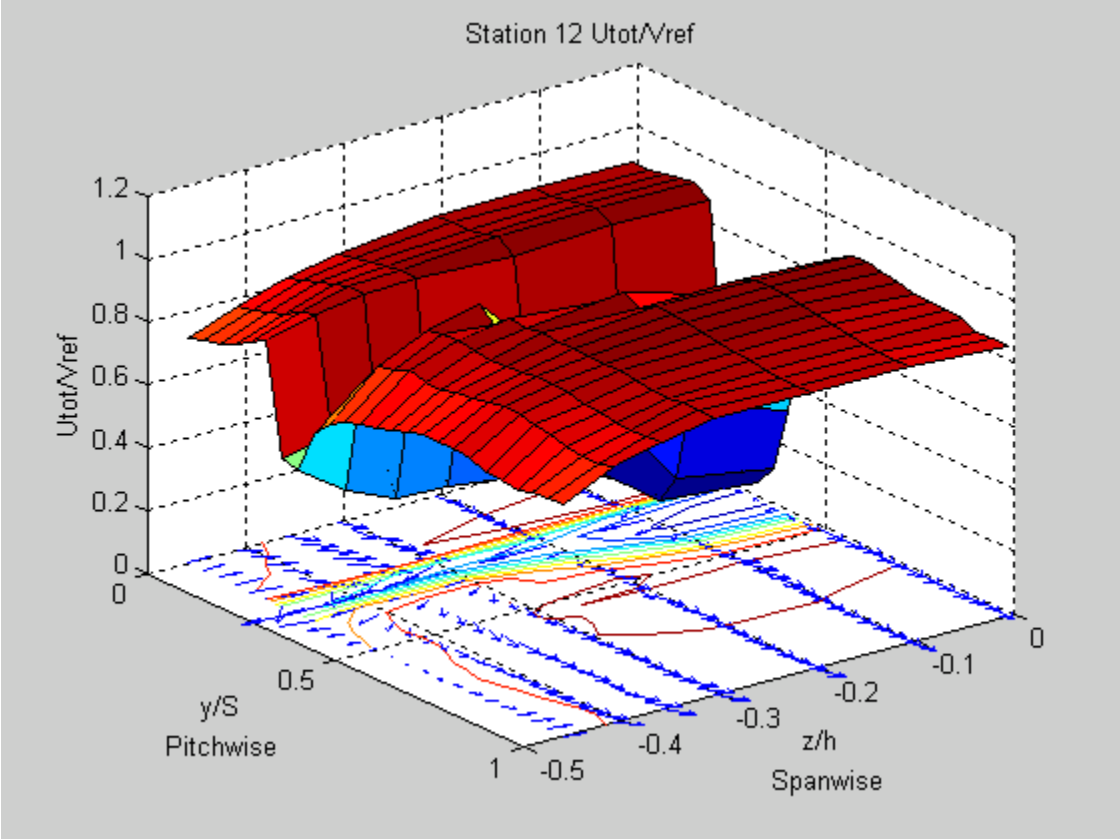


Figure 29. Station 12 Summary Surface, Vector and Contour Plot of Non-Dimensional Velocity (Utot/Vref)

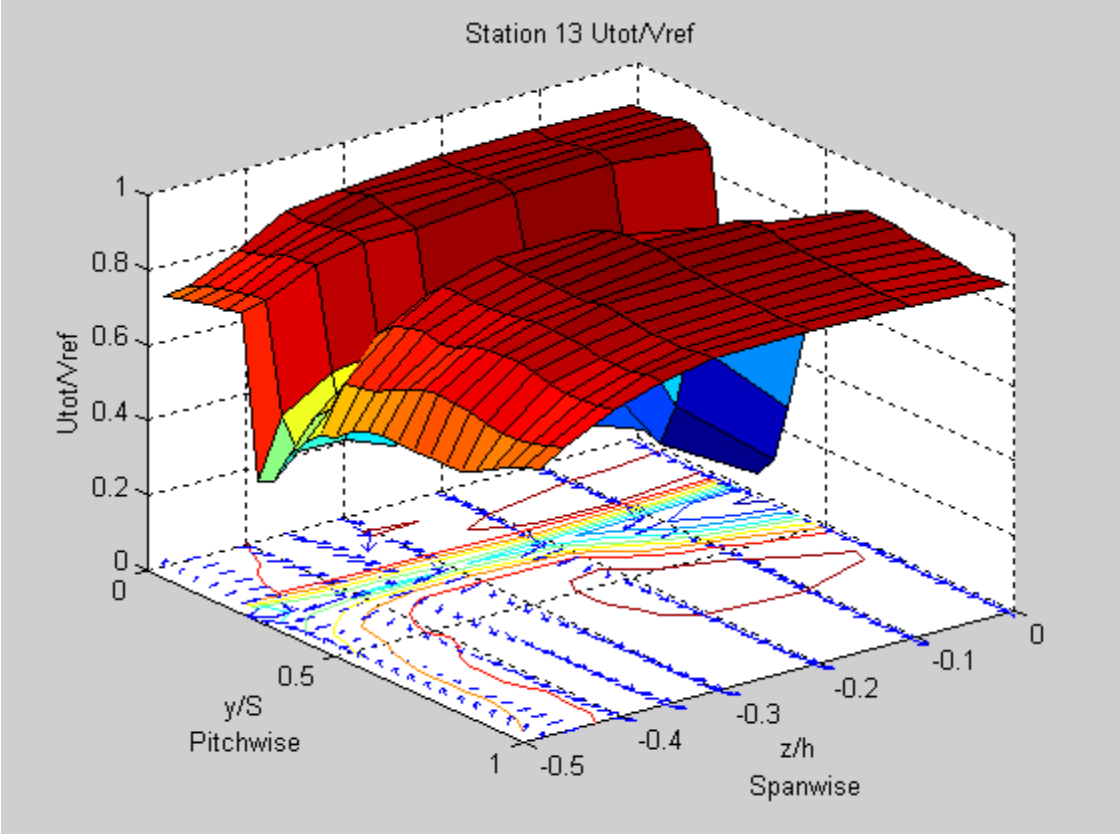


Figure 30. Station 13 Summary Surface, Vector and Contour Plot of Non-Dimensional Velocity (Utot/Vref)

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Second-generation controlled-diffusion compressor blade sections, which modeled the mid-span section of NASA's Stator 67B, were investigated in the LSCWT. The objective of the current study was to characterize the three-dimensional flow behavior upstream and downstream of the CD blades in the linear cascade.

Three-dimensional LDV measurements were conducted to characterize the flow upstream of the blades and in the wake region of the blades. The purpose of performing these measurements was to determine the extent of the corner vortex system, which resulted in mid-span flow separation on the blades. Inlet surveys were conducted to document the approaching flow field, so that the correct inlet boundary conditions could be determined for comparison with computational fluid dynamics results.

The inlet survey measured the influence of the inlet guide vanes on the approaching flow field, and it was determined that the blade profile had little or no influence on the flow at Station 1. This conclusion was reinforced by analyzing data from Carlson [Ref. 7] and the AA3802 Term Project [Ref.11]. Also, the total turbulence kinetic energy at Station 1 revealed the influence of the inlet guide vanes on the flow. It was concluded that a good correlation exists between these surveys and the previously conducted surveys, with good correlation to the computational fluid dynamics results.

The downstream wake surveys confirmed the existence of secondary flow vortices produced by the interaction of the end wall and blade surface boundary layers. The measurements illustrated the complex nature of the flow in the wake through the determined total velocity distribution; total turbulence kinetic energy and secondary flow vector and contour plots. It was concluded that the secondary flow vortices were approximately the same in magnitude for the end wall flow conditions and the reference Reynolds number present in this experiment. It was also concluded that they were counter rotating and their size and location were determined by surface vector and contour plots of non-dimensional velocity and total turbulence kinetic energy.

B. RECOMMENDATIONS

Further three-dimensional LDV studies should be performed to investigate vortex shedding in the wakes of the blades. Three-dimensional LDV surveys at higher angles of incidence should also be conducted to determine and characterize the approaching stall, and stall flow fields. It is also recommended to conduct three-dimensional surveys at intermediate stations between the blades to characterize the boundary layers at higher angles of incidence.

APPENDIX A. REFERENCE VELOCITY INPUT AND OUTPUT DATA FILES

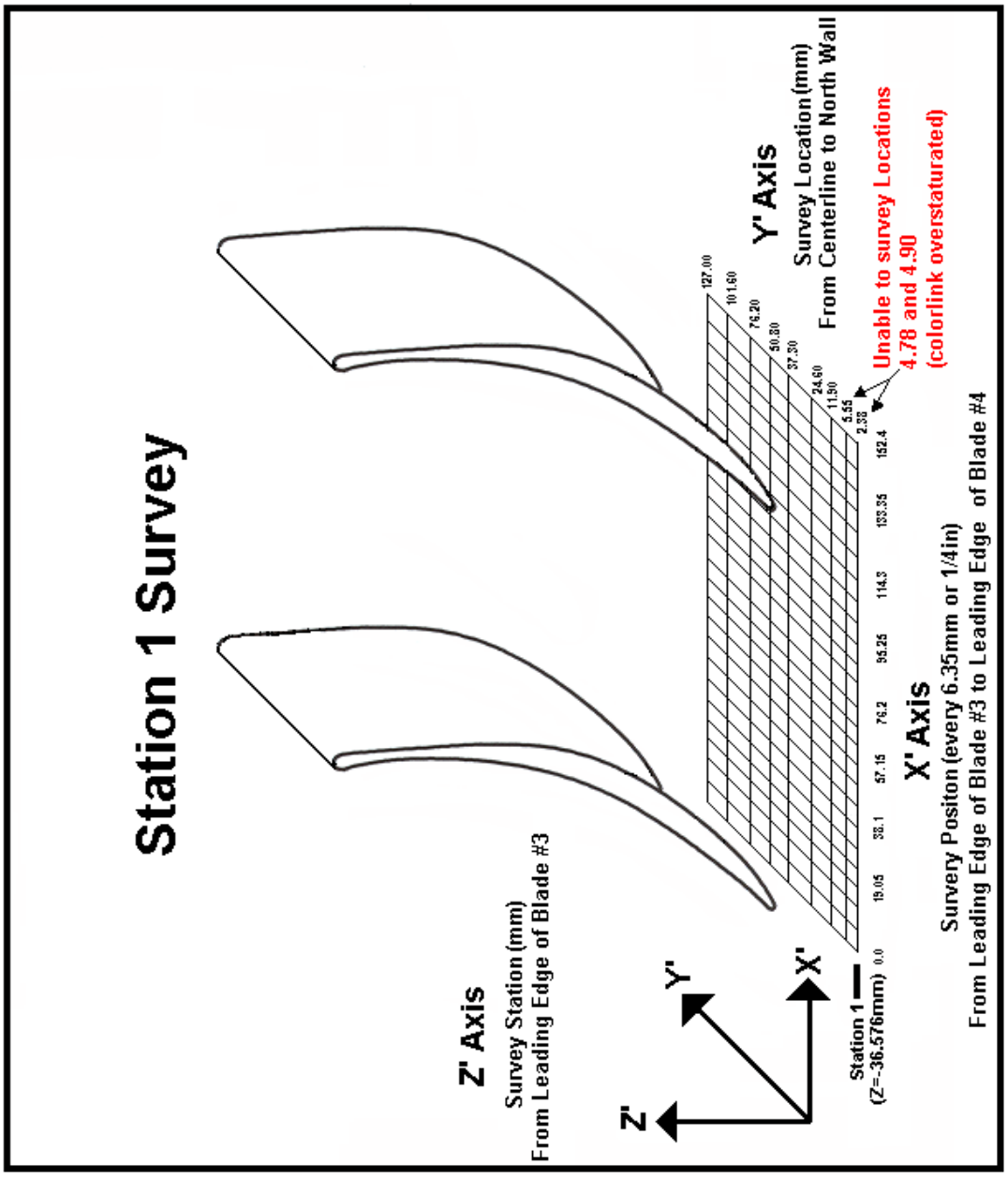
FORTRAN INPUT FILE FOR 'CALIB1' and 'CALIB.DAT'

Patm (mmHg)	Pplnm (inH_2O)	Temp (C)	Raw Data File
30.1331	12.0000	17.7778	sta1(0)0315.vt
30.0313	12.0000	18.6111	sta1(1)0315.vt
30.0109	12.0000	18.7778	sta1(1)0411.vt
30.0109	12.0000	18.7778	sta1(2)0411.vt
30.1331	12.0000	18.7778	sta1(2)0412.vt
30.1331	12.0000	19.0000	sta1(3)0412.vt
30.1331	12.0000	19.0000	sta1(353)0412.
30.1331	12.0000	17.7778	sta1(353)0413.
30.1331	12.0000	17.7778	sta1(403)0413.
30.0924	12.0000	18.6111	sta1(403)0416.
30.1331	12.0000	17.7778	sta1(453)0417.
30.0109	12.0000	18.6111	sta1(453)0419.
30.0109	12.0000	20.0000	sta11(0)0516.v
30.0109	12.0000	21.9444	sta11(1)0516.v
30.0109	12.0000	22.2222	sta11(2)0516.v
30.0109	12.0000	22.5000	sta11(3)0516.v
30.0109	12.0000	22.5000	sta11(353)0516
30.0109	12.0000	20.5556	sta11(353)0517
30.0109	12.0000	21.1111	sta11(403)0517
30.0109	12.0000	22.2222	sta11(453)0517
30.0109	12.0000	20.1111	sta12(0)0503.v
30.0109	12.0000	21.0000	sta12(1)0503.v
30.0109	12.0000	22.2222	sta12(2)0503.v
30.0109	12.0000	23.3333	sta12(3)0503.v
30.0109	12.0000	23.8889	sta12(353)0503
30.0109	12.0000	24.1667	sta12(403)0503
30.0109	11.9999	25.4444	sta12(453)0503
30.0109	12.0000	20.0000	sta13(0)0425.v
30.0109	12.0000	20.0000	sta13(1)0425.v
29.9702	12.0000	17.8889	sta13(1)0426.v
29.9702	12.0000	18.3333	sta13(2)0426.v
29.9702	12.0000	18.3333	sta13(3)0426.v
29.9702	12.0000	18.3333	sta13(353)0426
29.9702	12.0000	18.3333	sta13(403)0426
29.9702	12.0000	18.8889	sta13(453)0426
29.9702	12.0000	19.1667	sta13(478)0426

FORTRAN OUTPUT FILE 'CALIB.OUT'

EXPERIMENT NUMBER	REFERENCE VELOCITY (m/S)	NAME
1	70.5505	sta1(0)0315.
2	70.7689	sta1(1)0315.
3	70.8127	sta1(1)0411.
4	70.8127	sta1(2)0411.
5	70.6717	sta1(2)0412.
6	70.6986	sta1(3)0412.
7	70.6986	sta1(353)041
8	70.5505	sta1(353)041
9	70.5505	sta1(403)041
10	70.6984	sta1(403)041
11	70.5505	sta1(453)041
12	70.7925	sta1(453)041
29	70.9608	sta11(0)0516
30	71.1958	sta11(1)0516
31	71.2293	sta11(2)0516
32	71.2627	sta11(3)0516
33	71.2627	sta11(353)05
34	71.0280	sta11(353)05
35	71.0952	sta11(403)05
36	71.2293	sta11(453)05
22	70.9743	sta12(0)0503
23	71.0817	sta12(1)0503
24	71.2293	sta12(2)0503
25	71.3631	sta12(3)0503
26	71.4299	sta12(353)05
27	71.4633	sta12(403)05
28	71.6164	sta12(453)05
13	70.9608	sta13(0)0425
14	70.9608	sta13(1)0425
15	70.7520	sta13(1)0426
16	70.8060	sta13(2)0426
17	70.8060	sta13(3)0426
18	70.8060	sta13(353)04
19	70.8060	sta13(403)04
20	70.8734	sta13(453)04
21	70.9071	sta13(478)04

APPENDIX B: LDV REDUCED DATA



Station 1: Location 1 (centerline) raw data file: 031501_0.xls

Vref= 70.5505

Flowfield Coord.			Non-Dim. Velocity			Turbulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	127	-36.576	0.770	0.586	0.586	0.586	0.586	0.586	0.515	0.586	0.586	0.586	0.586	0.586	0.068	79.076	1.121	46.632	58.470	59.671
6.349	127	-36.576	0.665	0.020	0.771	1.982	3.096	2.722	10.461	0.356	0.250	0.077	0.117	0.093	0.018	71.837	1.018	49.216	88.901	40.806
12.699	127	-36.576	0.659	0.016	0.770	1.840	3.212	2.422	9.786	0.486	0.199	0.139	0.165	0.090	0.036	71.496	1.013	49.456	89.114	40.558
19.05	127	-36.576	0.659	0.017	0.769	1.702	2.904	1.914	7.497	-0.103	0.123	0.055	-0.042	0.076	0.020	71.448	1.013	49.391	89.058	40.625
25.399	127	-36.576	0.660	0.012	0.771	1.612	2.705	2.213	7.409	0.336	0.113	0.002	0.155	0.064	0.001	71.596	1.015	49.463	89.304	40.546
31.75	127	-36.576	0.666	0.011	0.784	1.549	2.616	2.566	7.914	0.390	0.288	0.345	0.193	0.146	0.103	72.557	1.028	49.659	89.369	40.348
38.1	127	-36.576	0.670	0.012	0.793	1.601	2.591	2.712	8.315	0.367	0.257	0.199	0.178	0.119	0.057	73.255	1.038	49.791	89.328	40.217
44.45	127	-36.576	0.666	0.010	0.795	1.715	2.778	2.801	9.251	0.225	0.214	0.113	0.095	0.090	0.029	73.204	1.038	50.045	89.461	39.960
50.799	127	-36.576	0.659	0.009	0.788	1.839	2.802	3.400	11.397	0.188	0.558	0.129	0.073	0.179	0.027	72.498	1.028	50.097	89.482	39.908
57.149	127	-36.576	0.660	0.009	0.794	1.685	2.792	2.381	8.155	0.287	0.165	0.138	0.123	0.083	0.042	72.843	1.032	50.233	89.473	39.772
63.5	127	-36.576	0.652	0.010	0.793	1.652	2.769	2.377	8.024	0.316	0.087	-0.015	0.139	0.044	-0.005	72.386	1.026	50.576	89.455	39.429
69.849	127	-36.576	0.648	0.014	0.793	1.623	2.783	2.266	7.758	0.595	0.074	-0.147	0.265	0.040	-0.047	72.263	1.024	50.780	89.241	39.230
76.2	127	-36.576	0.649	0.015	0.793	1.452	2.493	2.030	6.223	0.085	0.100	0.191	0.047	0.068	0.076	72.296	1.025	50.706	89.140	39.307
82.549	127	-36.576	0.646	0.013	0.796	1.597	2.681	2.355	7.641	0.382	0.137	0.134	0.179	0.073	0.043	72.362	1.026	50.932	89.254	39.078
88.9	127	-36.576	0.649	0.013	0.797	1.567	2.607	2.409	7.530	0.270	0.186	0.132	0.133	0.099	0.042	72.490	1.027	50.851	89.298	39.158
95.25	127	-36.576	0.650	0.014	0.793	1.628	2.731	2.533	8.263	0.340	0.107	0.116	0.154	0.052	0.034	72.350	1.026	50.696	89.236	39.315
101.599	127	-36.576	0.644	0.014	0.787	1.838	2.926	2.386	8.819	0.290	0.235	0.231	0.108	0.108	0.066	71.754	1.017	50.712	89.209	39.299
107.95	127	-36.576	0.636	0.012	0.778	1.878	2.951	2.227	8.596	0.075	0.228	0.128	0.027	0.110	0.039	70.896	1.005	50.715	89.318	39.293
114.299	127	-36.576	0.634	0.013	0.772	1.573	2.578	2.169	6.914	-0.065	0.096	0.047	-0.032	0.057	0.017	70.467	0.999	50.583	89.267	39.426
120.65	127	-36.576	0.635	0.012	0.763	1.607	2.713	2.033	7.036	-0.131	0.119	0.011	-0.060	0.073	0.004	70.062	0.993	50.250	89.313	39.758
127	127	-36.576	0.638	0.014	0.768	1.450	2.455	2.058	6.182	-0.006	0.083	0.320	-0.003	0.056	0.127	70.460	0.999	50.265	89.187	39.747
133.349	127	-36.576	0.651	0.017	0.778	1.457	2.481	2.857	8.221	-0.055	0.221	0.061	-0.031	0.107	0.017	71.579	1.015	50.077	89.044	39.939
139.699	127	-36.576	0.644	0.015	0.765	1.700	2.592	2.298	7.445	-0.089	0.267	0.183	-0.041	0.138	0.062	70.545	1.000	49.902	89.124	40.111
146.05	127	-36.576	0.649	0.015	0.760	1.534	2.559	2.076	6.605	0.132	0.098	-0.022	0.067	0.062	-0.008	70.519	1.000	49.528	89.140	40.485
152.4	127	-36.576	0.654	0.015	0.763	1.531	2.472	2.155	6.551	0.182	0.081	0.035	0.096	0.049	0.013	70.903	1.005	49.404	89.153	40.609

Station 1: Location 2 raw data file: 041101_1.xls

Vref= 70.8127

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	101.6	-36.576	0.735	0.585	0.579	2.490	2.142	2.111	7.623	0.310	0.169	0.208	0.112	0.062	0.092	79.497	1.123	47.187	58.545	58.964
6.349	101.6	-36.576	0.676	0.011	0.762	1.963	3.106	2.160	9.085	0.122	0.259	-0.130	0.040	0.122	-0.039	72.145	1.019	48.444	89.389	41.563
12.699	101.6	-36.576	0.676	0.015	0.763	1.913	2.967	1.942	8.118	0.003	0.227	0.047	0.001	0.122	0.016	72.235	1.020	48.468	89.174	41.544
19.05	101.6	-36.576	0.673	0.014	0.764	1.826	2.982	2.276	8.706	0.275	0.209	0.178	0.100	0.100	0.052	72.089	1.018	48.632	89.188	41.380
25.399	101.6	-36.576	0.672	0.014	0.771	1.670	2.835	1.863	7.148	0.076	0.215	0.151	0.032	0.138	0.057	72.422	1.023	48.941	89.233	41.070
31.75	101.6	-36.576	0.669	0.011	0.778	1.704	2.991	2.038	8.000	0.606	0.197	0.293	0.237	0.113	0.096	72.689	1.026	49.315	89.366	40.693
38.1	101.6	-36.576	0.664	0.012	0.781	1.719	2.792	2.108	7.595	0.508	0.194	0.098	0.211	0.107	0.033	72.605	1.025	49.608	89.347	40.400
44.45	101.6	-36.576	0.660	0.011	0.784	1.652	2.674	2.016	6.970	0.521	0.158	0.076	0.235	0.095	0.028	72.576	1.025	49.877	89.388	40.129
50.799	101.6	-36.576	0.659	0.013	0.789	1.607	2.732	2.389	7.876	0.381	0.178	0.346	0.173	0.092	0.106	72.769	1.028	50.126	89.292	39.883
57.149	101.6	-36.576	0.660	0.015	0.796	1.552	2.368	2.493	7.114	0.139	0.179	0.153	0.076	0.092	0.052	73.208	1.034	50.352	89.189	39.660
63.5	101.6	-36.576	0.647	0.008	0.794	1.717	2.530	2.866	8.780	0.319	0.349	0.059	0.146	0.141	0.016	72.562	1.025	50.814	89.578	39.189
69.849	101.6	-36.576	0.640	0.008	0.791	1.597	2.651	2.197	7.202	0.421	0.171	0.117	0.198	0.097	0.040	72.070	1.018	51.022	89.560	38.982
76.2	101.6	-36.576	0.640	0.009	0.792	1.476	2.481	2.052	6.274	0.319	0.069	-0.081	0.173	0.045	-0.032	72.136	1.019	51.065	89.519	38.939
82.549	101.6	-36.576	0.640	0.008	0.793	1.508	2.578	2.416	7.378	0.333	0.079	0.061	0.171	0.043	0.019	72.128	1.019	51.099	89.548	38.905
88.9	101.6	-36.576	0.628	0.007	0.784	1.774	2.633	2.411	7.946	0.128	0.258	0.071	0.055	0.120	0.022	71.163	1.005	51.325	89.587	38.678
95.25	101.6	-36.576	0.618	0.006	0.777	1.613	2.653	1.884	6.595	0.204	0.055	0.091	0.095	0.036	0.036	70.331	0.993	51.495	89.641	38.507
101.599	101.6	-36.576	0.618	0.002	0.770	1.475	2.514	2.155	6.569	0.031	0.079	0.014	0.016	0.049	0.005	69.949	0.988	51.260	89.889	38.740
107.95	101.6	-36.576	0.619	0.004	0.765	1.461	2.443	1.971	5.994	0.106	0.055	0.083	0.059	0.038	0.034	69.683	0.984	50.998	89.796	39.003
114.299	101.6	-36.576	0.624	0.003	0.759	1.448	2.238	2.081	5.718	-0.161	0.113	0.042	-0.099	0.075	0.018	69.613	0.983	50.588	89.811	39.413
120.65	101.6	-36.576	0.627	0.007	0.754	1.619	2.763	2.540	8.354	-0.426	0.223	0.006	-0.190	0.108	0.002	69.466	0.981	50.279	89.598	39.724
127	101.6	-36.576	0.631	0.010	0.752	1.441	2.438	2.583	7.347	0.193	0.134	-0.175	0.110	0.072	-0.055	69.527	0.982	50.009	89.390	39.998
133.349	101.6	-36.576	0.636	0.014	0.747	1.517	2.359	2.370	6.740	0.172	0.142	0.061	0.096	0.079	0.022	69.520	0.982	49.589	89.191	40.423
139.699	101.6	-36.576	0.646	0.021	0.747	1.404	2.370	2.305	6.448	-0.023	0.037	-0.044	-0.014	0.023	-0.016	69.962	0.988	49.138	88.756	40.889
146.05	101.6	-36.576	0.645	0.018	0.742	1.477	2.511	2.171	6.600	-0.039	-0.001	-0.040	-0.021	-0.001	-0.015	69.638	0.983	48.996	88.936	41.024
152.4	101.6	-36.576	0.654	0.018	0.742	1.495	2.485	2.218	6.665	0.014	0.093	0.045	0.007	0.056	0.016	70.071	0.989	48.629	88.929	41.392

Station 1: Location 3 raw data file: 041201_2.xls

Vref= 70.6717

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	76.2	-36.576	0.664	0.009	0.762	1.901	2.928	2.363	8.885	0.462	-0.108	-0.003	0.166	-0.048	-0.001	71.415	1.011	48.938	89.503	41.067
6.349	76.2	-36.576	0.673	0.014	0.769	1.721	2.969	2.113	8.123	0.295	-0.036	0.043	0.116	-0.020	0.014	72.232	1.022	48.824	89.201	41.187
12.699	76.2	-36.576	0.678	0.021	0.778	1.601	2.597	2.072	6.801	0.057	0.099	0.130	0.028	0.060	0.048	72.974	1.033	48.939	88.825	41.085
19.05	76.2	-36.576	0.684	0.019	0.787	1.672	2.816	1.843	7.062	0.352	0.027	-0.025	0.149	0.018	-0.010	73.688	1.043	49.036	88.980	40.983
25.399	76.2	-36.576	0.685	0.017	0.793	1.618	2.709	2.103	7.191	0.343	0.002	0.034	0.157	0.001	0.012	74.060	1.048	49.207	89.069	40.808
31.75	76.2	-36.576	0.682	0.014	0.796	1.776	2.920	2.098	8.041	0.814	0.107	0.205	0.314	0.057	0.067	74.086	1.048	49.418	89.208	40.593
38.1	76.2	-36.576	0.679	0.013	0.799	1.750	2.780	2.038	7.472	0.471	0.017	0.100	0.194	0.010	0.035	74.131	1.049	49.636	89.294	40.373
44.45	76.2	-36.576	0.674	0.010	0.802	1.826	3.084	2.056	8.535	0.712	-0.058	-0.145	0.253	-0.031	-0.046	74.032	1.048	49.927	89.437	40.079
50.799	76.2	-36.576	0.669	0.012	0.805	1.743	2.924	2.080	7.956	0.105	-0.006	0.072	0.041	-0.003	0.024	73.974	1.047	50.243	89.329	39.765
57.149	76.2	-36.576	0.669	0.014	0.812	1.788	2.737	2.492	8.448	0.289	0.148	0.158	0.118	0.066	0.046	74.336	1.052	50.508	89.217	39.503
63.5	76.2	-36.576	0.663	0.017	0.814	1.854	3.086	2.379	9.312	0.232	0.115	0.136	0.081	0.052	0.037	74.210	1.050	50.825	89.084	39.190
69.849	76.2	-36.576	0.655	0.017	0.809	1.981	2.937	2.226	8.754	0.412	0.254	-0.042	0.142	0.115	-0.013	73.601	1.041	51.007	89.082	39.008
76.2	76.2	-36.576	0.647	0.014	0.799	1.788	2.919	2.089	8.040	0.559	0.205	0.104	0.214	0.110	0.034	72.657	1.028	50.996	89.239	39.014
82.549	76.2	-36.576	0.642	0.011	0.791	1.726	2.861	2.303	8.234	0.644	0.152	-0.023	0.261	0.077	-0.007	71.961	1.018	50.939	89.403	39.068
88.9	76.2	-36.576	0.637	0.010	0.782	1.720	2.807	2.214	7.870	0.583	0.222	0.030	0.242	0.117	0.010	71.297	1.009	50.814	89.443	39.191
95.25	76.2	-36.576	0.636	0.010	0.776	1.730	3.040	2.088	8.295	0.180	0.112	0.209	0.068	0.062	0.066	70.929	1.004	50.675	89.449	39.330
101.599	76.2	-36.576	0.633	0.008	0.779	1.815	3.056	2.117	8.558	0.488	0.126	0.291	0.176	0.066	0.090	70.950	1.004	50.889	89.521	39.115
107.95	76.2	-36.576	0.637	0.008	0.775	1.736	2.776	2.356	8.137	0.360	0.290	0.170	0.150	0.142	0.052	70.908	1.003	50.607	89.551	39.397
114.299	76.2	-36.576	0.633	0.013	0.770	1.718	2.996	2.645	9.461	0.070	0.256	0.469	0.027	0.113	0.119	70.461	0.997	50.601	89.245	39.409
120.65	76.2	-36.576	0.637	0.015	0.766	1.721	2.842	2.023	7.565	0.426	0.164	0.069	0.174	0.094	0.024	70.436	0.997	50.251	89.111	39.763
127	76.2	-36.576	0.641	0.017	0.758	1.684	2.730	2.095	7.341	0.584	0.100	0.214	0.254	0.057	0.075	70.185	0.993	49.797	89.042	40.219
133.349	76.2	-36.576	0.646	0.016	0.752	1.627	2.814	2.589	8.634	0.366	0.138	0.293	0.160	0.066	0.081	70.082	0.992	49.324	89.054	40.692
139.699	76.2	-36.576	0.649	0.015	0.749	1.623	2.703	2.105	7.187	0.521	0.090	0.195	0.238	0.053	0.069	70.039	0.991	49.065	89.124	40.949
146.05	76.2	-36.576	0.657	0.014	0.748	1.681	2.740	2.122	7.417	0.693	0.113	0.033	0.301	0.064	0.011	70.353	0.995	48.712	89.196	41.299
152.4	76.2	-36.576	0.665	0.014	0.750	1.702	2.773	2.511	8.447	0.361	0.331	0.153	0.153	0.155	0.044	70.814	1.002	48.433	89.213	41.578

Station 1: Location 4 raw data file: 041201_3.xls

Vref= 70.6986

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	50.799	-36.576	0.658	0.008	0.744	2.247	3.819	3.142	14.754	0.655	0.322	0.602	0.153	0.091	0.100	70.197	0.993	48.520	89.526	41.484
6.349	50.799	-36.576	0.666	0.008	0.749	2.067	3.474	3.366	13.835	0.494	0.345	0.498	0.138	0.099	0.085	70.885	1.003	48.356	89.534	41.648
12.699	50.799	-36.576	0.673	0.014	0.759	2.107	3.589	3.126	13.544	0.834	0.513	0.522	0.221	0.156	0.093	71.753	1.015	48.444	89.212	41.567
19.05	50.799	-36.576	0.674	0.015	0.772	2.060	3.485	2.804	12.124	0.578	0.308	0.419	0.161	0.107	0.086	72.460	1.025	48.903	89.139	41.111
25.399	50.799	-36.576	0.666	0.014	0.779	2.059	3.332	2.382	10.506	0.910	0.389	0.504	0.265	0.159	0.127	72.430	1.024	49.466	89.210	40.546
31.75	50.799	-36.576	0.664	0.012	0.781	2.087	3.377	2.713	11.561	0.852	0.332	0.291	0.242	0.117	0.064	72.468	1.025	49.622	89.352	40.385
38.1	50.799	-36.576	0.658	0.007	0.782	2.041	3.438	2.392	10.853	0.561	0.056	0.258	0.160	0.023	0.063	72.253	1.022	49.950	89.581	40.053
44.45	50.799	-36.576	0.651	0.005	0.783	1.994	3.209	2.942	11.463	0.280	0.153	0.104	0.088	0.052	0.022	71.989	1.018	50.271	89.730	39.731
50.799	50.799	-36.576	0.646	0.005	0.786	1.873	3.184	2.904	11.040	0.447	0.059	0.299	0.150	0.022	0.065	71.905	1.017	50.590	89.719	39.412
57.149	50.799	-36.576	0.644	0.009	0.792	1.894	3.297	3.158	12.214	0.520	0.281	0.604	0.167	0.094	0.116	72.152	1.021	50.864	89.483	39.141
63.5	50.799	-36.576	0.644	0.016	0.797	1.941	3.483	3.016	12.497	0.353	0.372	0.219	0.104	0.127	0.042	72.445	1.025	51.044	89.126	38.970
69.849	50.799	-36.576	0.643	0.015	0.800	1.855	3.053	2.836	10.404	0.248	0.165	0.183	0.088	0.063	0.042	72.580	1.027	51.216	89.173	38.796
76.2	50.799	-36.576	0.640	0.013	0.793	2.047	3.461	2.491	11.187	1.074	0.304	0.275	0.303	0.119	0.064	72.048	1.019	51.110	89.288	38.899
82.549	50.799	-36.576	0.634	0.012	0.787	2.003	3.283	2.264	9.957	0.391	0.152	0.079	0.119	0.067	0.021	71.426	1.010	51.139	89.332	38.869
88.9	50.799	-36.576	0.625	0.007	0.774	2.190	3.444	2.348	11.084	0.487	0.185	0.454	0.129	0.072	0.112	70.372	0.995	51.080	89.574	38.923
95.25	50.799	-36.576	0.616	0.007	0.766	2.095	3.261	2.660	11.048	0.493	0.127	0.007	0.144	0.045	0.002	69.494	0.983	51.164	89.609	38.839
101.599	50.799	-36.576	0.613	0.008	0.760	2.043	3.291	2.627	10.954	0.279	0.379	0.062	0.083	0.141	0.014	69.036	0.976	51.106	89.558	38.898
107.95	50.799	-36.576	0.613	0.008	0.755	1.929	3.258	3.381	12.882	0.317	0.474	0.624	0.101	0.146	0.113	68.764	0.973	50.917	89.547	39.087
114.299	50.799	-36.576	0.618	0.012	0.754	2.008	3.196	3.206	12.264	0.328	0.552	0.705	0.102	0.172	0.138	68.951	0.975	50.656	89.323	39.353
120.65	50.799	-36.576	0.627	0.019	0.755	1.951	3.115	2.890	10.933	0.517	0.459	0.425	0.170	0.163	0.094	69.421	0.982	50.319	88.904	39.703
127	50.799	-36.576	0.633	0.019	0.751	1.952	3.187	2.678	10.570	0.476	0.239	0.209	0.153	0.091	0.049	69.454	0.982	49.858	88.894	40.163
133.349	50.799	-36.576	0.638	0.019	0.743	2.139	3.307	2.850	11.817	0.903	0.245	0.193	0.255	0.080	0.041	69.247	0.979	49.357	88.903	40.664
139.699	50.799	-36.576	0.639	0.015	0.747	1.813	3.045	2.354	9.051	0.701	0.065	0.091	0.254	0.030	0.025	69.508	0.983	49.442	89.122	40.572
146.05	50.799	-36.576	0.643	0.010	0.741	1.889	3.053	2.576	9.762	0.544	0.180	-0.213	0.189	0.074	-0.054	69.368	0.981	49.065	89.438	40.941
152.4	50.799	-36.576	0.653	0.005	0.745	1.757	3.019	2.485	9.189	0.436	0.025	0.080	0.165	0.011	0.021	70.048	0.991	48.734	89.731	41.268

Station 1: Location 5 raw data file: 4131_353.xls

Vref= 70.5505

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	37.306	-36.576	0.647	0.003	0.719	2.597	4.574	3.119	18.694	0.090	0.205	0.107	0.015	0.051	0.015	68.259	0.968	48.029	89.840	41.972
6.349	37.306	-36.576	0.651	0.003	0.720	2.741	4.346	3.325	18.730	1.129	0.154	0.081	0.190	0.034	0.011	68.487	0.971	47.867	89.799	42.134
12.699	37.306	-36.576	0.658	0.004	0.729	2.575	4.294	3.474	18.567	0.961	0.542	0.572	0.175	0.122	0.077	69.296	0.982	47.919	89.743	42.082
19.05	37.306	-36.576	0.660	0.005	0.732	2.701	4.190	3.709	19.304	1.129	1.248	0.944	0.200	0.250	0.122	69.531	0.986	47.929	89.707	42.073
25.399	37.306	-36.576	0.668	0.009	0.743	2.717	4.246	3.828	20.032	1.481	1.135	0.439	0.258	0.219	0.054	70.479	0.999	48.048	89.467	41.957
31.75	37.306	-36.576	0.665	0.014	0.764	2.383	3.774	3.428	15.835	0.724	0.365	0.398	0.162	0.090	0.062	71.504	1.014	48.957	89.185	41.055
38.1	37.306	-36.576	0.662	0.014	0.770	2.441	3.858	3.121	15.293	1.174	0.451	0.156	0.250	0.119	0.026	71.642	1.015	49.305	89.206	40.706
44.45	37.306	-36.576	0.654	0.008	0.769	2.535	4.132	2.818	15.723	0.849	0.317	-0.099	0.163	0.089	-0.017	71.223	1.010	49.593	89.539	40.411
50.799	37.306	-36.576	0.648	0.008	0.768	2.475	4.245	3.406	17.872	0.542	0.128	0.191	0.104	0.031	0.027	70.874	1.005	49.860	89.519	40.144
57.149	37.306	-36.576	0.641	0.004	0.770	2.416	3.826	3.177	15.284	0.436	0.298	0.345	0.095	0.078	0.057	70.701	1.002	50.200	89.754	39.802
63.5	37.306	-36.576	0.638	0.008	0.773	2.343	3.972	3.521	16.830	0.223	0.360	0.054	0.048	0.088	0.008	70.718	1.002	50.470	89.534	39.534
69.849	37.306	-36.576	0.637	0.010	0.775	2.359	3.896	3.724	17.306	0.778	0.282	0.254	0.170	0.064	0.035	70.776	1.003	50.558	89.403	39.448
76.2	37.306	-36.576	0.634	0.019	0.778	2.246	3.599	3.380	14.710	0.598	0.772	0.398	0.149	0.204	0.066	70.794	1.003	50.818	88.916	39.203
82.549	37.306	-36.576	0.634	0.015	0.773	2.242	3.734	3.035	14.088	0.707	0.308	0.293	0.170	0.091	0.052	70.551	1.000	50.667	89.163	39.346
88.9	37.306	-36.576	0.624	0.012	0.765	2.546	4.147	2.844	15.884	1.233	0.620	0.419	0.235	0.172	0.071	69.682	0.988	50.797	89.329	39.212
95.25	37.306	-36.576	0.611	0.007	0.746	2.480	3.947	2.817	14.832	0.753	0.167	0.051	0.155	0.048	0.009	68.063	0.965	50.696	89.610	39.306
101.599	37.306	-36.576	0.606	0.003	0.737	2.492	4.058	2.968	15.742	0.598	0.434	0.066	0.119	0.118	0.011	67.299	0.954	50.564	89.803	39.437
107.95	37.306	-36.576	0.607	0.006	0.730	2.259	4.091	3.418	16.760	0.568	0.223	-0.073	0.123	0.058	-0.010	66.969	0.949	50.249	89.622	39.753
114.299	37.306	-36.576	0.605	0.008	0.736	2.300	3.855	3.796	17.282	0.638	0.734	0.734	0.145	0.169	0.101	67.239	0.953	50.581	89.518	39.423
120.65	37.306	-36.576	0.617	0.015	0.739	2.306	3.749	3.864	17.150	0.003	0.672	0.593	0.001	0.151	0.082	67.947	0.963	50.125	89.137	39.888
127	37.306	-36.576	0.627	0.016	0.741	2.318	3.787	3.440	15.772	1.078	0.762	0.633	0.247	0.192	0.098	68.480	0.971	49.786	89.027	40.231
133.349	37.306	-36.576	0.634	0.019	0.741	2.483	3.824	3.336	15.956	1.325	0.589	0.409	0.280	0.143	0.064	68.846	0.976	49.446	88.895	40.576
139.699	37.306	-36.576	0.641	0.020	0.732	2.509	4.078	3.435	17.363	1.316	0.600	0.187	0.258	0.140	0.027	68.679	0.973	48.799	88.820	41.226
146.05	37.306	-36.576	0.643	0.019	0.723	2.757	4.376	3.210	18.526	1.312	0.819	0.691	0.219	0.186	0.099	68.272	0.968	48.364	88.879	41.659
152.4	37.306	-36.576	0.647	0.017	0.714	2.829	4.448	3.457	19.871	1.139	0.845	0.907	0.182	0.173	0.118	67.984	0.964	47.856	89.000	42.162

Station 1: Location 6 raw data file: 4161_403 .xls

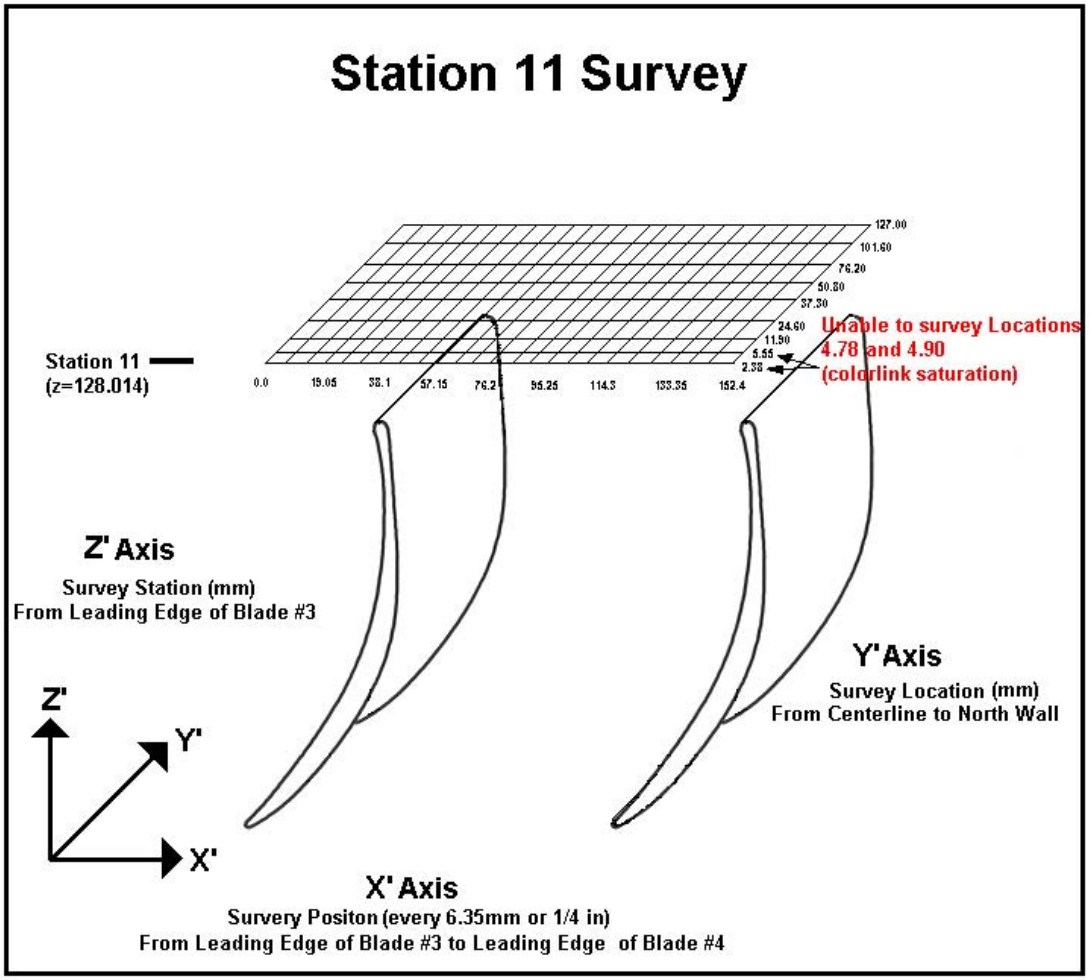
Vref= 70.6984

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	24.606	-36.576	0.627	0.007	0.697	2.913	4.898	3.553	22.548	1.091	0.214	0.291	0.153	0.041	0.033	66.263	0.937	48.011	89.580	41.992
6.349	24.606	-36.576	0.634	0.010	0.705	2.760	4.577	3.566	20.641	1.200	0.139	0.222	0.190	0.028	0.027	67.052	0.948	48.060	89.384	41.947
12.699	24.606	-36.576	0.639	0.014	0.713	2.638	4.552	3.798	21.052	0.856	0.503	0.902	0.143	0.100	0.104	67.655	0.957	48.143	89.166	41.869
19.05	24.606	-36.576	0.649	0.018	0.727	3.020	4.734	3.940	23.528	1.650	0.896	0.636	0.231	0.151	0.068	68.867	0.974	48.257	88.959	41.762
25.399	24.606	-36.576	0.653	0.014	0.734	2.854	4.664	4.017	23.018	2.046	0.918	0.602	0.308	0.160	0.064	69.488	0.983	48.358	89.165	41.654
31.75	24.606	-36.576	0.649	0.017	0.753	2.945	4.861	3.853	23.574	2.689	0.621	0.633	0.376	0.110	0.068	70.289	0.994	49.284	88.997	40.733
38.1	24.606	-36.576	0.650	0.017	0.758	2.759	4.789	3.583	21.691	2.432	0.617	0.242	0.368	0.125	0.028	70.610	0.999	49.406	89.021	40.611
44.45	24.606	-36.576	0.644	0.018	0.760	2.835	4.817	3.648	22.273	1.726	0.432	0.358	0.253	0.084	0.041	70.413	0.996	49.725	88.961	40.294
50.799	24.606	-36.576	0.636	0.015	0.762	2.639	4.638	3.351	19.855	1.463	0.368	0.076	0.239	0.083	0.010	70.214	0.993	50.153	89.157	39.859
57.149	24.606	-36.576	0.629	0.011	0.759	2.623	4.467	3.566	19.770	0.980	0.310	0.179	0.167	0.066	0.022	69.689	0.986	50.328	89.343	39.680
63.5	24.606	-36.576	0.621	0.009	0.755	2.574	4.494	3.542	19.684	0.632	0.508	0.193	0.109	0.112	0.024	69.141	0.978	50.578	89.484	39.427
69.849	24.606	-36.576	0.618	0.008	0.752	2.686	4.476	3.525	19.837	1.207	0.676	0.683	0.201	0.143	0.087	68.823	0.974	50.562	89.558	39.442
76.2	24.606	-36.576	0.612	0.014	0.753	2.781	4.400	3.776	20.675	1.398	0.868	1.025	0.229	0.165	0.123	68.614	0.971	50.878	89.196	39.133
82.549	24.606	-36.576	0.607	0.013	0.750	2.757	4.497	3.769	21.013	1.041	0.415	0.214	0.168	0.080	0.025	68.220	0.965	50.984	89.253	39.026
88.9	24.606	-36.576	0.609	0.014	0.749	2.746	4.496	3.526	20.093	1.262	0.387	0.704	0.205	0.080	0.089	68.232	0.965	50.908	89.187	39.104
95.25	24.606	-36.576	0.607	0.012	0.742	2.661	4.341	3.483	19.027	0.976	0.327	0.281	0.169	0.071	0.037	67.783	0.959	50.752	89.262	39.257
101.599	24.606	-36.576	0.602	0.010	0.734	2.713	4.562	3.476	20.126	1.072	0.318	0.162	0.173	0.068	0.020	67.161	0.950	50.647	89.398	39.360
107.95	24.606	-36.576	0.599	0.011	0.720	2.959	4.492	4.867	26.312	0.980	0.444	1.255	0.148	0.062	0.115	66.210	0.937	50.216	89.352	39.792
114.299	24.606	-36.576	0.595	0.015	0.724	2.906	4.708	4.458	25.240	1.140	1.106	2.452	0.167	0.171	0.234	66.266	0.937	50.630	89.095	39.385
120.65	24.606	-36.576	0.594	0.017	0.718	3.809	7.899	3.836	45.810	-8.501	0.886	0.454	-0.565	0.121	0.030	65.908	0.932	50.391	88.941	39.629
127	24.606	-36.576	0.608	0.002	0.709	5.379	10.705	6.325	91.764	-22.145	-4.068	15.735	-0.769	-0.239	0.465	66.008	0.934	49.366	89.902	40.634
133.349	24.606	-36.576	0.817	-0.384	0.684	13.091	-22.806	3.679	352.505	-137.270	2.553	0.038	-0.920	0.106	0.001	80.068	1.133	43.826	109.832	52.867
139.669	24.606	-36.576	0.817	-0.384	0.684	13.091	-22.806	3.679	352.505	-137.270	2.553	0.038	-0.920	0.106	0.001	80.068	1.133	43.826	109.832	52.867
146.05	24.606	-36.576	0.617	0.018	0.696	2.963	4.875	3.933	24.006	2.087	0.641	1.358	0.289	0.110	0.142	65.778	0.930	48.463	88.890	41.559
152.4	24.606	-36.576	0.625	0.019	0.699	3.318	4.766	4.085	25.202	1.583	1.879	0.590	0.200	0.277	0.061	66.324	0.938	48.225	88.860	41.798

Station 1: Location 7 raw data file: 4191_453 .xls

Vref= 70.7925

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	11.906	-36.576	0.603	0.020	0.664	3.083	4.949	4.263	26.085	1.526	0.843	0.218	0.200	0.128	0.021	63.511	0.897	47.744	88.727	42.284
6.349	11.906	-36.576	0.609	0.017	0.665	3.223	5.110	4.398	27.921	1.830	1.277	1.155	0.222	0.180	0.103	63.836	0.902	47.498	88.895	42.524
12.699	11.906	-36.576	0.611	0.017	0.667	3.382	5.256	4.513	29.720	1.184	1.504	1.478	0.133	0.197	0.124	64.044	0.905	47.505	88.909	42.516
19.05	11.906	-36.576	0.612	0.019	0.671	3.586	5.367	4.770	32.210	2.242	2.030	1.353	0.232	0.237	0.105	64.286	0.908	47.657	88.805	42.368
25.399	11.906	-36.576	0.600	0.015	0.680	3.413	5.432	4.983	32.990	1.870	1.318	0.755	0.201	0.155	0.056	64.184	0.907	48.589	89.044	41.427
31.75	11.906	-36.576	0.608	0.022	0.699	3.241	5.037	4.672	28.855	2.226	1.039	0.637	0.272	0.137	0.054	65.627	0.927	49.006	88.638	41.027
38.1	11.906	-36.576	0.609	0.023	0.714	2.952	4.825	4.543	26.318	2.101	0.486	1.133	0.294	0.072	0.103	66.412	0.938	49.557	88.609	40.477
44.45	11.906	-36.576	0.609	0.020	0.721	2.856	4.637	3.877	22.345	1.778	0.294	0.715	0.268	0.053	0.079	66.808	0.944	49.817	88.803	40.208
50.799	11.906	-36.576	0.605	0.018	0.724	2.942	4.709	3.910	23.063	1.734	1.192	0.857	0.250	0.207	0.093	66.788	0.943	50.101	88.884	39.921
57.149	11.906	-36.576	0.588	0.010	0.729	3.178	5.145	4.419	28.054	1.726	1.557	0.920	0.211	0.221	0.081	66.321	0.937	51.090	89.369	38.917
63.5	11.906	-36.576	0.581	0.014	0.724	3.212	5.280	4.719	30.234	2.232	1.271	0.608	0.263	0.167	0.049	65.702	0.928	51.259	89.128	38.755
69.849	11.906	-36.576	0.577	0.012	0.716	3.522	5.618	4.972	34.343	3.037	1.261	0.829	0.306	0.144	0.059	65.126	0.920	51.156	89.226	38.855
76.2	11.906	-36.576	0.574	0.012	0.718	3.364	5.657	4.577	32.131	2.792	1.075	1.078	0.293	0.139	0.083	65.066	0.919	51.353	89.234	38.657
82.549	11.906	-36.576	0.576	0.013	0.719	3.277	5.498	4.512	30.665	2.143	1.143	0.247	0.237	0.154	0.020	65.225	0.921	51.331	89.164	38.681
88.9	11.906	-36.576	0.579	0.012	0.718	3.183	5.284	4.291	28.236	2.011	0.908	0.735	0.239	0.133	0.065	65.294	0.922	51.124	89.225	38.887
95.25	11.906	-36.576	0.578	0.013	0.713	3.104	5.182	4.082	26.575	2.434	0.972	0.588	0.302	0.153	0.055	65.001	0.918	50.990	89.169	39.023
101.599	11.906	-36.576	0.572	0.010	0.712	2.903	4.803	4.437	25.593	1.785	1.360	0.676	0.255	0.211	0.063	64.655	0.913	51.241	89.384	38.766
107.95	11.906	-36.576	0.575	0.011	0.712	2.871	4.764	4.078	23.787	1.701	0.798	0.507	0.248	0.136	0.052	64.820	0.916	51.073	89.311	38.936
114.299	11.906	-36.576	0.577	0.013	0.705	3.122	5.023	4.021	25.571	2.112	1.044	1.319	0.269	0.166	0.130	64.507	0.911	50.707	89.209	39.304
120.65	11.906	-36.576	0.575	0.012	0.693	3.502	5.524	4.489	31.465	3.168	2.291	1.168	0.327	0.291	0.094	63.758	0.901	50.331	89.242	39.680
127	11.906	-36.576	0.576	0.011	0.686	3.941	5.737	4.918	36.316	3.492	2.939	2.727	0.308	0.303	0.193	63.443	0.896	49.979	89.281	40.031
133.349	11.906	-36.576	0.573	0.010	0.673	4.004	6.243	5.153	40.779	3.691	2.460	1.225	0.295	0.238	0.076	62.564	0.884	49.576	89.335	40.432
139.699	11.906	-36.576	0.577	0.009	0.657	3.779	5.892	5.002	37.009	2.786	2.017	2.117	0.250	0.213	0.143	61.909	0.875	48.747	89.407	41.259
146.05	11.906	-36.576	0.587	0.017	0.654	3.490	5.441	4.746	32.157	3.362	1.420	1.352	0.353	0.171	0.104	62.222	0.879	48.131	88.918	41.889
152.4	11.906	-36.576	0.597	0.017	0.664	3.132	5.090	4.554	28.227	2.188	0.838	0.622	0.274	0.117	0.054	63.238	0.893	48.043	88.935	41.977


Station 11 Survey
Station 11
(z=128.014)
127.00
101.60
76.20
50.80
37.30
24.60
11.50
5.55
2.38
0.0
19.05
38.1
57.15
76.2
95.25
114.3
133.35
152.4
Unable to survey Locations
4.78 and 4.90
(colorlink saturation)
Z' Axis
Survey Station (mm)
From Leading Edge of Blade #3
Y' Axis
Survey Location (mm)
From Centerline to North Wall
Z'
Y'
X'
X' Axis
Survery Positon (every 6.35mm or 1/4 in)
From Leading Edge of Blade #3 to Leading Edge of Blade #4

Station 11: Location 1 (centerline) raw data file: 051611_0 .xls

Vref= 70.9608

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	127	128.014	0.150	-0.015	0.884	1.801	2.912	2.542	9.093	-0.093	0.283	0.275	-0.035	0.123	0.074	63.609	0.896	80.379	90.929	9.667
6.349	127	128.014	0.138	-0.011	0.888	1.870	2.959	1.898	7.926	-0.048	0.343	0.350	-0.017	0.192	0.124	63.777	0.899	81.179	90.701	8.849
12.699	127	128.014	0.124	-0.009	0.897	1.913	3.206	2.335	9.695	0.043	0.400	0.366	0.014	0.178	0.097	64.231	0.905	82.156	90.601	7.867
19.05	127	128.014	0.101	-0.010	0.909	2.042	3.239	2.375	10.153	-0.197	0.298	0.213	-0.059	0.122	0.055	64.886	0.914	83.687	90.607	6.343
25.399	127	128.014	0.078	-0.008	0.918	2.137	3.495	4.752	19.681	0.087	0.297	0.140	0.023	0.058	0.017	65.369	0.921	85.170	90.510	4.857
31.75	127	128.014	0.056	-0.011	0.867	3.034	5.369	11.987	90.858	0.644	0.504	-0.258	0.079	0.028	-0.008	61.652	0.869	86.277	90.696	3.787
38.1	127	128.014	-0.047	-0.022	0.085	10.554	17.663	13.959	309.115	6.516	6.806	5.632	0.069	0.092	0.045	7.039	0.099	118.270	102.791	31.521
44.45	127	128.014	-0.031	0.000	0.024	10.049	16.127	9.202	222.876	8.394	0.008	1.100	0.103	0.000	0.015	2.779	0.039	141.655	90.645	51.662
50.799	127	128.014	0.022	-0.004	0.046	10.936	19.203	10.144	295.616	15.339	-1.942	-3.361	0.145	-0.035	-0.034	3.655	0.052	64.328	94.652	26.152
57.149	127	128.014	0.064	-0.018	0.150	12.604	21.862	17.152	465.492	17.890	-5.589	-10.688	0.129	-0.051	-0.057	11.648	0.164	67.113	96.154	23.792
63.5	127	128.014	0.113	-0.021	0.433	12.545	21.604	23.103	578.916	24.990	-9.925	-20.654	0.183	-0.068	-0.082	31.775	0.448	75.321	92.650	14.927
69.849	127	128.014	0.165	-0.002	0.707	8.989	16.366	18.771	350.497	9.810	-4.294	-13.614	0.132	-0.051	-0.088	51.525	0.726	76.853	90.184	13.148
76.2	127	128.014	0.194	0.008	0.840	6.032	10.096	10.844	127.947	0.520	-1.981	-1.975	0.017	-0.060	-0.036	61.174	0.862	77.018	89.466	12.993
82.549	127	128.014	0.191	0.017	0.896	3.462	5.641	4.243	30.906	0.285	-1.294	-2.071	0.029	-0.175	-0.172	65.016	0.916	77.955	88.911	12.095
88.9	127	128.014	0.194	0.022	0.831	3.061	3.522	13.777	105.791	1.031	-2.788	1.860	0.190	-0.131	0.076	60.538	0.853	76.881	88.537	13.203
95.25	127	128.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
101.599	127	128.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
107.95	127	128.014	0.181	0.009	0.474	1.572	2.442	18.459	174.592	-0.375	4.099	-5.479	-0.194	0.281	-0.241	36.031	0.508	69.074	89.002	20.952
114.299	127	128.014	0.177	0.006	0.868	1.625	2.436	1.625	5.608	0.126	0.284	0.311	0.063	0.214	0.156	62.904	0.886	78.451	89.605	11.556
120.65	127	128.014	0.173	0.007	0.858	1.506	2.558	3.022	8.972	-0.066	0.137	0.178	-0.034	0.060	0.046	62.121	0.875	78.611	89.555	11.398
127	127	128.014	0.168	0.006	0.847	1.454	2.333	1.610	5.075	-0.067	0.163	0.109	-0.039	0.139	0.058	61.291	0.864	78.789	89.635	11.218
133.349	127	128.014	0.162	0.003	0.838	1.397	2.452	1.930	5.846	0.043	0.187	0.254	0.025	0.137	0.107	60.564	0.853	79.082	89.809	10.920
139.699	127	128.014	0.155	0.001	0.842	1.452	2.366	1.935	5.726	-0.018	0.234	0.259	-0.011	0.165	0.112	60.754	0.856	79.591	89.922	10.409
146.05	127	128.014	0.148	-0.004	0.842	1.466	2.480	2.486	7.240	0.053	0.223	0.053	0.029	0.122	0.017	60.668	0.855	80.061	90.236	9.942
152.4	127	128.014	0.138	-0.004	0.844	1.772	2.866	2.795	9.584	0.341	0.212	0.304	0.133	0.085	0.075	60.661	0.855	80.687	90.242	9.317

Station 11: Location 2 raw data file:051611_1.xls

Vref= 71.1958

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	101.6	128.014	0.148	0.017	0.862	1.943	3.058	1.886	8.343	-0.028	0.622	0.337	-0.009	0.335	0.115	62.270	0.875	80.291	88.910	9.771
6.349	101.6	128.014	0.133	0.022	0.864	1.854	2.801	2.369	8.445	-0.047	0.388	-0.009	-0.018	0.174	-0.003	62.281	0.875	81.257	88.591	8.857
12.699	101.6	128.014	0.119	0.021	0.873	1.884	2.876	2.468	8.954	0.113	0.337	0.103	0.041	0.143	0.029	62.776	0.882	82.225	88.655	7.892
19.05	101.6	128.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25.399	101.6	128.014	0.084	0.021	0.913	1.901	3.288	2.544	10.447	-0.304	0.143	0.170	-0.096	0.058	0.040	65.300	0.917	84.759	88.670	5.408
31.75	101.6	128.014	0.073	0.027	0.909	2.318	4.045	8.658	48.349	-0.412	0.547	-1.443	-0.087	0.054	-0.081	64.929	0.912	85.419	88.321	4.880
38.1	101.6	128.014	-0.023	-0.136	0.055	9.427	16.722	10.700	241.492	7.008	6.876	7.119	0.088	0.134	0.078	10.577	0.149	98.831	156.495	68.401
44.45	101.6	128.014	0.020	-0.111	0.050	9.983	16.605	10.223	239.944	-1.052	-1.393	1.334	-0.013	-0.027	0.016	8.763	0.123	80.748	154.182	66.125
50.799	101.6	128.014	0.045	-0.046	0.115	11.336	19.856	15.384	379.722	2.780	-11.595	-0.854	0.024	-0.131	-0.006	9.376	0.132	70.044	110.477	29.258
57.149	101.6	128.014	0.081	-0.017	0.287	12.463	22.035	21.701	555.904	9.497	-15.550	-19.398	0.068	-0.113	-0.080	21.255	0.299	74.307	93.280	16.050
63.5	101.6	128.014	0.130	0.019	0.602	10.982	19.020	22.989	505.424	16.889	-7.039	-16.740	0.160	-0.055	-0.076	43.898	0.617	77.842	88.244	12.288
69.849	101.6	128.014	0.172	0.040	0.798	6.950	12.390	14.929	212.337	10.564	-0.727	-4.583	0.242	-0.014	-0.049	58.172	0.817	77.849	87.170	12.487
76.2	101.6	128.014	0.183	0.035	0.895	4.110	6.857	7.237	58.146	2.752	-1.805	-1.724	0.193	-0.120	-0.069	65.094	0.914	78.471	87.811	11.741
82.549	101.6	128.014	0.186	0.024	0.918	2.757	4.178	3.560	18.866	0.953	-0.576	-0.600	0.163	-0.116	-0.080	66.732	0.937	78.535	88.503	11.565
88.9	101.6	128.014	0.188	0.017	0.896	2.248	3.432	4.539	18.719	0.368	-0.070	0.074	0.094	-0.014	0.009	65.196	0.916	78.141	88.924	11.910
95.25	101.6	128.014	0.191	0.008	0.499	1.943	3.018	18.967	186.321	-0.490	-1.599	1.146	-0.165	-0.086	0.039	38.041	0.534	69.042	89.129	20.978
101.599	101.6	128.014	0.193	0.019	0.898	2.455	3.465	2.887	13.183	0.826	0.782	-0.135	0.192	0.218	-0.027	65.372	0.918	77.875	88.805	12.186
107.95	101.6	128.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
114.299	101.6	128.014	0.185	0.013	0.877	1.574	2.466	1.650	5.641	-0.098	0.204	0.153	-0.050	0.155	0.074	63.811	0.896	78.065	89.154	11.966
120.65	101.6	128.014	0.184	0.012	0.871	1.559	2.587	1.799	6.180	0.071	0.216	0.103	0.035	0.152	0.044	63.351	0.890	78.085	89.220	11.941
127	101.6	128.014	0.180	0.010	0.866	1.514	2.522	1.889	6.111	0.108	0.212	0.125	0.056	0.146	0.052	62.989	0.885	78.291	89.382	11.726
133.349	101.6	128.014	0.175	0.010	0.862	1.571	2.584	2.138	6.856	-0.234	0.121	0.052	-0.114	0.071	0.019	62.641	0.880	78.501	89.348	11.518
139.699	101.6	128.014	0.164	0.013	0.851	1.807	3.092	1.694	7.847	-0.802	0.230	0.168	-0.283	0.148	0.063	61.734	0.867	79.091	89.138	10.944
146.05	101.6	128.014	0.155	0.014	0.849	1.683	2.872	1.761	7.092	-0.278	0.228	0.288	-0.113	0.152	0.113	61.483	0.864	79.667	89.092	10.374
152.4	101.6	128.014	0.142	0.016	0.848	1.654	2.995	1.726	7.343	-0.331	0.159	0.229	-0.132	0.110	0.088	61.217	0.860	80.462	88.966	9.595

Station11: Location 3 raw data file: 051611_2.xls

Vref= 71.2293

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	76.2	128.014	0.160	0.034	0.865	2.080	2.842	1.902	8.009	-0.245	0.552	0.297	-0.082	0.275	0.108	62.691	0.880	79.520	87.762	10.722
6.349	76.2	128.014	0.144	0.036	0.871	1.947	2.912	2.777	9.991	-0.004	0.519	0.140	-0.002	0.189	0.034	62.924	0.883	80.648	87.651	9.648
12.699	76.2	128.014	0.133	0.034	0.878	2.005	3.060	2.415	9.610	0.138	0.416	0.374	0.044	0.169	0.100	63.306	0.889	81.420	87.802	8.861
19.05	76.2	128.014	0.114	0.037	0.894	2.069	3.052	2.628	10.252	-0.338	0.384	0.144	-0.105	0.139	0.035	64.220	0.902	82.708	87.675	7.658
25.399	76.2	128.014	0.098	0.038	0.911	2.070	3.425	2.271	10.584	-0.763	-0.060	0.277	-0.212	-0.025	0.070	65.294	0.917	83.865	87.637	6.578
31.75	76.2	128.014	0.089	0.040	0.891	3.394	4.502	10.683	72.953	-3.568	0.060	-0.632	-0.460	0.003	-0.026	63.818	0.896	84.295	87.414	6.267
38.1	76.2	128.014	-0.029	-0.263	0.047	7.388	13.462	9.946	167.361	-6.825	4.129	-0.135	-0.135	0.111	-0.002	19.101	0.268	96.135	168.229	79.993
44.45	76.2	128.014	-0.028	-0.143	0.164	8.998	15.492	13.596	252.915	-11.180	-0.925	1.812	-0.158	-0.015	0.017	15.638	0.220	97.357	130.562	41.510
50.799	76.2	128.014	0.033	-0.039	0.392	10.596	16.572	18.401	362.760	8.319	-6.403	-10.650	0.093	-0.065	-0.069	28.138	0.395	85.158	95.634	7.439
57.149	76.2	128.014	0.087	-0.008	0.722	7.391	13.448	17.925	278.385	6.126	-3.645	-16.244	0.121	-0.054	-0.133	51.832	0.728	83.117	90.634	6.913
63.5	76.2	128.014	0.115	0.021	0.864	4.365	7.604	12.154	112.301	5.571	0.280	1.090	0.331	0.010	0.023	62.076	0.871	82.434	88.613	7.694
69.849	76.2	128.014	0.135	0.009	0.913	2.675	4.185	9.331	55.871	1.354	0.045	0.410	0.238	0.004	0.021	65.770	0.923	81.578	89.472	8.439
76.2	76.2	128.014	0.156	0.005	0.918	2.150	3.465	7.732	38.208	0.294	0.253	-0.497	0.078	0.030	-0.037	66.317	0.931	80.353	89.716	9.651
82.549	76.2	128.014	0.166	0.004	0.916	1.958	2.906	4.851	17.906	-0.286	0.098	0.164	-0.099	0.020	0.023	66.321	0.931	79.730	89.759	10.273
88.9	76.2	128.014	0.178	0.009	0.903	2.238	3.309	7.157	33.590	0.595	0.270	0.174	0.158	0.033	0.014	65.528	0.920	78.872	89.460	11.141
95.25	76.2	128.014	0.186	0.014	0.904	1.660	2.747	2.453	8.159	-0.194	0.169	0.064	-0.084	0.082	0.019	65.720	0.923	78.371	89.154	11.661
101.599	76.2	128.014	0.189	0.020	0.896	1.561	2.483	3.276	9.668	-0.115	0.055	0.028	-0.058	0.021	0.007	65.203	0.915	78.115	88.766	11.951
107.95	76.2	128.014	0.189	0.020	0.889	1.451	2.447	3.186	9.121	0.061	0.152	0.177	0.034	0.065	0.045	64.757	0.909	77.984	88.718	12.086
114.299	76.2	128.014	0.192	0.017	0.884	1.641	2.532	2.482	7.632	0.072	0.237	0.097	0.034	0.115	0.030	64.465	0.905	77.768	88.938	12.280
120.65	76.2	128.014	0.191	0.016	0.880	1.777	2.600	3.024	9.531	-0.100	0.378	0.325	-0.043	0.139	0.082	64.164	0.901	77.729	89.005	12.313
127	76.2	128.014	0.189	0.019	0.873	1.855	2.716	2.411	8.314	-0.239	0.347	0.243	-0.094	0.153	0.073	63.608	0.893	77.776	88.807	12.284
133.349	76.2	128.014	0.186	0.020	0.867	1.755	2.856	1.696	7.056	0.053	0.255	0.030	0.021	0.169	0.012	63.174	0.887	77.918	88.700	12.154
139.699	76.2	128.014	0.175	0.026	0.858	1.834	2.808	2.149	7.934	-0.338	0.281	0.211	-0.129	0.140	0.069	62.367	0.876	78.483	88.320	11.642
146.05	76.2	128.014	0.169	0.029	0.857	1.885	2.904	1.761	7.543	-0.079	0.319	0.366	-0.028	0.189	0.141	62.256	0.874	78.821	88.098	11.344
152.4	76.2	128.014	0.156	0.033	0.852	1.824	2.965	1.707	7.517	-0.292	0.273	0.226	-0.106	0.173	0.088	61.739	0.867	79.658	87.800	10.579

Station 11: Location 4 raw data file: 051611_3.xls

Vref= 71.2627

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	50.799	128.014	0.166	0.058	0.853	2.080	12.555	3.259	86.282	-0.224	0.524	0.796	-0.065	0.201	0.195	62.096	0.871	79.039	86.203	11.616
6.349	50.799	128.014	0.149	0.061	0.862	2.067	13.839	3.155	102.873	0.023	0.331	0.620	0.007	0.145	0.178	62.474	0.877	80.192	85.987	10.612
12.699	50.799	128.014	0.142	0.067	0.872	2.048	14.433	3.172	111.284	0.065	0.249	0.526	0.020	0.113	0.154	63.121	0.886	80.780	85.682	10.197
19.05	50.799	128.014	0.126	0.068	0.881	2.040	16.160	3.332	138.203	0.037	0.396	0.438	0.011	0.175	0.119	63.646	0.893	81.875	85.620	9.245
25.399	50.799	128.014	0.107	0.073	0.895	2.280	21.377	3.571	237.460	0.426	0.229	0.315	0.103	0.060	0.053	64.420	0.904	83.223	85.339	8.237
31.75	50.799	128.014	0.092	0.078	0.910	2.372	25.772	4.264	344.012	0.132	-0.007	0.125	0.026	-0.001	0.010	65.416	0.918	84.244	85.138	7.545
38.1	50.799	128.014	0.016	-0.193	0.176	11.641	723.608	18.987	3.E+05	21.745	15.028	10.956	0.194	0.151	0.067	18.628	0.261	86.472	137.516	47.734
44.45	50.799	128.014	-0.016	-0.123	0.286	8.971	556.690	15.571	2.E+05	-10.518	-5.312	-8.392	-0.148	-0.075	-0.068	22.199	0.312	92.965	113.296	23.506
50.799	50.799	128.014	0.027	-0.048	0.577	7.754	284.791	13.759	4.E+04	4.319	-10.582	-13.113	0.080	-0.126	-0.088	41.303	0.580	87.308	94.777	5.487
57.149	50.799	128.014	0.080	-0.040	0.852	4.592	57.595	7.589	1697.92	4.016	-1.256	-4.760	0.227	-0.042	-0.096	61.037	0.857	84.658	92.680	5.980
63.5	50.799	128.014	0.113	-0.048	0.897	2.834	24.998	4.340	325.877	0.144	-0.833	-0.633	0.023	-0.087	-0.043	64.505	0.905	82.804	93.064	7.827
69.849	50.799	128.014	0.137	-0.044	0.902	2.524	18.444	4.050	181.483	-0.439	-0.043	0.230	-0.085	-0.011	0.036	65.074	0.913	81.379	92.785	9.066
76.2	50.799	128.014	0.157	-0.042	0.896	3.180	20.291	4.335	220.315	0.322	2.704	2.565	0.046	0.398	0.277	64.888	0.911	80.090	92.642	10.264
82.549	50.799	128.014	0.173	-0.029	0.899	2.306	13.328	3.809	98.727	-0.082	0.291	0.460	-0.018	0.117	0.112	65.290	0.916	79.113	91.824	11.043
88.9	50.799	128.014	0.177	-0.013	0.893	2.234	12.613	3.576	88.428	-0.541	-0.143	0.167	-0.133	-0.034	0.025	64.914	0.911	78.789	90.796	11.240
95.25	50.799	128.014	0.177	-0.004	0.896	2.016	11.413	3.352	72.774	0.174	0.298	0.605	0.051	0.101	0.123	65.090	0.913	78.850	90.225	11.153
101.599	50.799	128.014	0.184	0.006	0.892	2.006	10.903	3.285	66.844	0.236	0.357	0.495	0.071	0.091	0.077	64.902	0.911	78.345	89.610	11.662
107.95	50.799	128.014	0.187	0.011	0.892	2.078	11.082	3.133	68.471	0.071	0.441	0.145	0.021	0.111	0.024	64.967	0.912	78.131	89.331	11.888
114.299	50.799	128.014	0.184	0.010	0.880	2.181	11.853	3.396	78.394	-0.214	0.503	0.300	-0.057	0.146	0.056	64.109	0.900	78.197	89.348	11.821
120.65	50.799	128.014	0.185	0.011	0.877	2.016	10.874	3.260	66.470	-0.016	0.282	0.433	-0.005	0.079	0.076	63.867	0.896	78.064	89.317	11.956
127	50.799	128.014	0.183	0.025	0.869	1.895	10.336	3.099	60.012	-0.041	0.310	0.202	-0.014	0.095	0.038	63.346	0.889	78.095	88.381	12.017
133.349	50.799	128.014	0.177	0.021	0.849	3.757	21.247	4.686	243.753	1.403	2.894	13.870	0.157	0.167	0.642	61.789	0.867	78.234	88.590	11.853
139.699	50.799	128.014	0.175	0.039	0.867	1.849	10.575	2.973	62.045	-0.080	0.385	0.714	-0.029	0.164	0.189	63.077	0.885	78.609	87.504	11.669
146.05	50.799	128.014	0.170	0.041	0.860	1.926	11.347	3.053	70.899	0.156	0.472	0.918	0.052	0.148	0.181	62.548	0.878	78.849	87.343	11.472
152.4	50.799	128.014	0.183	0.028	0.866	4.886	26.771	4.268	379.390	-2.889	3.449	1.849	-0.273	0.395	0.242	63.106	0.886	78.106	88.212	12.032

Station11: Location 5 raw data file: 51711353.xls

Vref= 71.2627

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	37.306	128.014	0.137	0.061	0.809	2.545	4.021	5.761	27.920	0.198	0.718	1.231	0.038	0.096	0.105	58.664	0.823	80.410	85.768	10.499
6.349	37.306	128.014	0.132	0.065	0.817	2.463	3.979	5.321	25.109	0.285	1.035	1.008	0.057	0.156	0.094	59.178	0.830	80.830	85.482	10.240
12.699	37.306	128.014	0.122	0.076	0.827	2.299	4.187	5.155	24.697	0.450	0.574	1.244	0.092	0.095	0.113	59.792	0.839	81.609	84.830	9.876
19.05	37.306	128.014	0.111	0.081	0.846	2.523	4.057	5.701	27.666	0.265	0.752	0.992	0.051	0.103	0.084	61.099	0.857	82.534	84.567	9.252
25.399	37.306	128.014	0.098	0.092	0.866	2.615	4.391	4.619	23.730	0.732	0.833	1.056	0.126	0.136	0.102	62.469	0.877	83.602	84.008	8.784
31.75	37.306	128.014	0.082	0.104	0.872	5.086	7.194	9.228	81.388	-5.630	-5.291	2.676	-0.303	-0.222	0.079	62.846	0.882	84.639	83.252	8.634
38.1	37.306	128.014	0.009	-0.117	0.188	11.632	20.472	17.737	434.502	37.727	14.911	29.380	0.312	0.142	0.159	15.777	0.221	87.592	122.005	32.118
44.45	37.306	128.014	-0.012	-0.114	0.392	9.555	17.187	21.075	415.414	-0.477	-8.226	-1.517	-0.006	-0.080	-0.008	29.072	0.408	91.669	106.227	16.317
50.799	37.306	128.014	0.027	-0.101	0.648	8.161	14.532	19.979	338.479	6.909	-1.000	-10.188	0.115	-0.012	-0.069	46.798	0.657	87.672	98.821	9.127
57.149	37.306	128.014	0.085	-0.081	0.820	4.868	8.165	11.671	113.290	-1.040	0.643	1.150	-0.052	0.022	0.024	59.042	0.829	84.121	95.615	8.143
63.5	37.306	128.014	0.116	-0.061	0.837	3.751	5.950	11.355	89.200	-2.094	0.376	0.180	-0.185	0.017	0.005	60.343	0.847	82.131	94.152	8.910
69.849	37.306	128.014	0.135	-0.049	0.861	3.244	4.770	8.149	49.842	-0.423	2.239	1.450	-0.054	0.167	0.073	62.223	0.873	81.102	93.232	9.476
76.2	37.306	128.014	0.146	-0.042	0.863	2.917	4.848	6.602	37.798	-0.794	1.391	-0.124	-0.111	0.142	-0.008	62.457	0.876	80.426	92.720	9.960
82.549	37.306	128.014	0.152	-0.030	0.858	2.682	4.216	4.382	22.088	0.218	1.309	1.046	0.038	0.219	0.112	62.119	0.872	79.928	92.004	10.273
88.9	37.306	128.014	0.146	-0.019	0.850	2.530	4.333	5.401	27.175	-0.191	0.729	0.943	-0.034	0.105	0.079	61.494	0.863	80.233	91.242	9.847
95.25	37.306	128.014	0.149	-0.001	0.849	2.540	4.144	6.072	30.243	0.115	1.242	1.017	0.022	0.159	0.080	61.450	0.862	80.051	90.053	9.950
101.599	37.306	128.014	0.160	0.007	0.860	2.526	4.054	6.335	31.474	0.584	1.056	1.860	0.112	0.130	0.143	62.302	0.874	79.471	89.541	10.539
107.95	37.306	128.014	0.166	0.019	0.857	2.600	4.109	7.190	37.668	0.709	0.782	0.503	0.131	0.082	0.034	62.234	0.873	79.056	88.774	11.015
114.299	37.306	128.014	0.167	0.018	0.851	2.573	4.165	5.585	27.578	0.800	1.161	1.065	0.147	0.159	0.090	61.794	0.867	78.896	88.827	11.168
120.65	37.306	128.014	0.159	0.006	0.842	2.601	4.183	5.979	30.004	0.427	0.465	1.070	0.077	0.059	0.084	61.041	0.857	79.272	89.589	10.736
127	37.306	128.014	0.160	0.012	0.826	3.819	5.562	10.143	74.199	2.856	9.863	12.590	0.265	0.501	0.439	59.974	0.842	79.040	89.194	10.990
133.349	37.306	128.014	0.162	0.017	0.821	2.517	4.208	5.845	29.106	-0.093	0.861	0.782	-0.017	0.115	0.063	59.630	0.837	78.823	88.832	11.240
139.699	37.306	128.014	0.160	0.025	0.823	2.453	4.159	4.999	24.152	0.174	0.707	1.456	0.034	0.114	0.138	59.792	0.839	79.016	88.276	11.121
146.05	37.306	128.014	0.156	0.031	0.816	3.673	4.185	8.011	47.595	0.680	5.532	3.420	0.087	0.370	0.201	59.241	0.831	79.160	87.870	11.052
152.4	37.306	128.014	0.151	0.041	0.830	2.556	4.153	5.195	25.384	0.295	0.717	1.109	0.055	0.106	0.101	60.169	0.844	79.719	87.219	10.658

Station11: Location 6 raw data file:51711403.xls

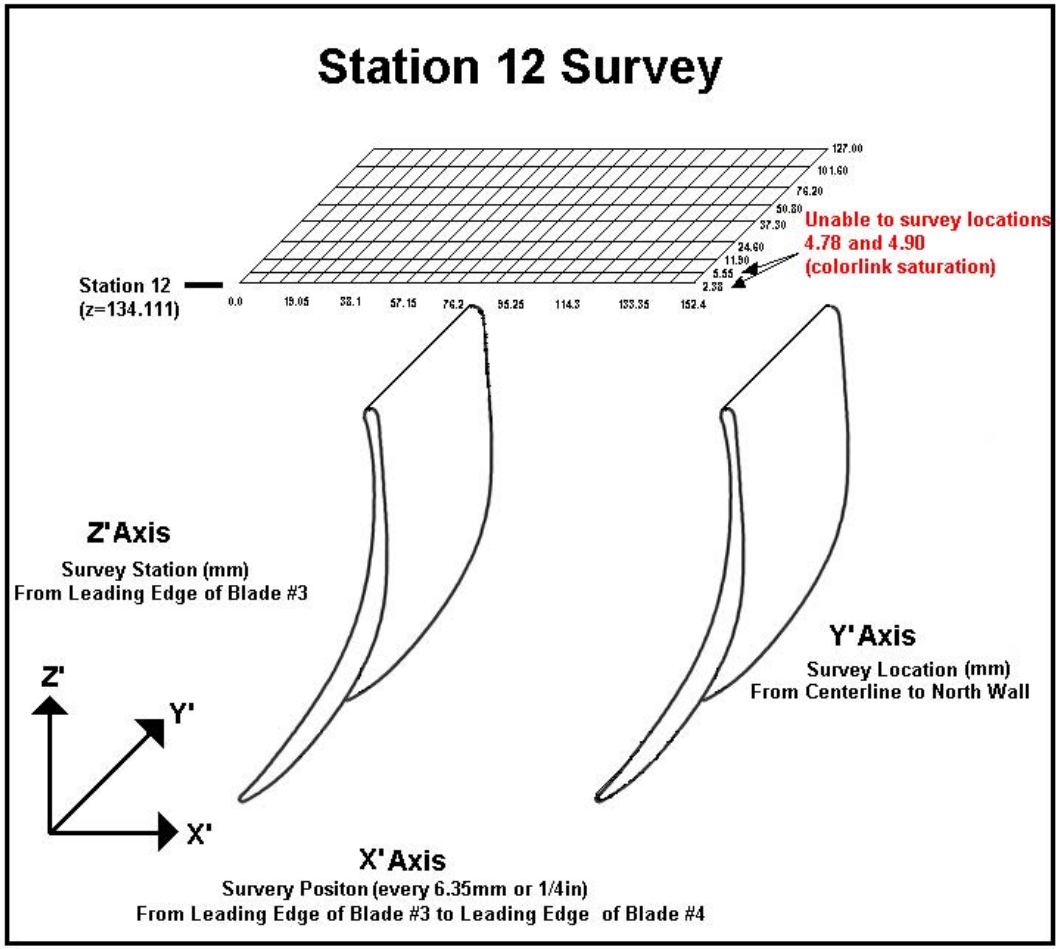
Vref= 71.0952

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	24.606	128.014	0.112	0.074	0.812	3.266	5.185	5.079	31.675	0.718	1.648	1.351	0.084	0.197	0.101	58.526	0.823	82.147	84.861	9.403
6.349	24.606	128.014	0.110	0.079	0.822	3.193	5.097	5.603	33.781	1.744	2.084	2.319	0.212	0.230	0.161	59.214	0.833	82.416	84.572	9.345
12.699	24.606	128.014	-59.511	-103.160	0.772	33642	58268	19.883	2.E+09	1.E+09	232497	402675	1.000	0.688	0.688	8467	119.097	119.979	150.018	89.629
19.05	24.606	128.014	-2778.35	-6265.88	0.316	778187	1374527	40.004	1.E+12	5.E+11	4432950	9997270	0.944	0.282	0.360	487303	6854.23	113.913	156.087	89.997
25.399	24.606	128.014	0.098	0.082	0.840	5.196	8.905	8.015	85.270	-11.906	-3.425	-0.187	-0.509	-0.163	-0.005	60.422	0.850	83.393	84.439	8.652
31.75	24.606	128.014	0.081	0.143	0.870	5.426	6.471	9.847	84.136	-4.505	-6.702	0.050	-0.254	-0.248	0.002	62.950	0.885	84.746	80.694	10.710
38.1	24.606	128.014	-162.763	-480.928	0.172	133547	231391	20.145	4.E+10	1.2E+10	1.4E+05	4.2E+05	0.747	0.104	0.177	36097	507.725	108.698	161.302	89.981
44.45	24.606	128.014	-5.098	-36.529	0.214	55630	111183	13.525	8.E+09	2.8E+09	5.5E+03	3.9E+04	0.888	0.014	0.052	2622	36.884	97.945	172.048	89.667
50.799	24.606	128.014	-706.491	-1628.39	0.188	287931	534393	25.041	2.E+11	7.0E+10	6.7E+05	1.5E+06	0.896	0.184	0.228	126198	1775.06	113.454	156.546	89.994
57.149	24.606	128.014	0.082	0.011	0.741	6.417	11.611	17.595	242.805	20.117	8.355	-9.294	0.534	0.146	-0.090	52.998	0.745	83.669	89.140	6.389
63.5	24.606	128.014	-1003.18	-2986.52	0.538	546990	1021335	40.132	7.E+11	3.E+11	2726680	8116690	0.912	0.246	0.392	223986	3151	108.567	161.433	89.990
69.849	24.606	128.014	-860.241	-2073.40	0.682	387225	742859	33.734	4.E+11	1.E+11	2963580	7142110	0.913	0.449	0.564	159592	2245	112.533	157.467	89.983
76.2	24.606	128.014	-3554.19	-8452.50	0.046	799167	1398838	19.180	1.E+12	5.E+11	826862	1966360	0.918	0.107	0.145	651896	9169	112.806	157.194	90.000
82.549	24.606	128.014	-1016.60	-2549.37	0.613	568736	1035111	36.984	7.E+11	3.E+11	3147800	7892920	0.942	0.296	0.408	195127	2745	111.740	158.260	89.987
88.9	24.606	128.014	0.121	-0.010	0.827	3.323	5.412	6.648	42.268	0.340	2.344	2.763	0.037	0.210	0.152	59.415	0.836	81.643	90.708	8.387
95.25	24.606	128.014	-606.67	-1576.53	0.675	392285	749574	31.473	4.E+11	1.E+11	2071730	5382700	0.922	0.332	0.451	120096	1689	111.047	158.953	89.977
101.599	24.606	128.014	-984.52	-2592.36	0.613	447842	831853	36.524	4.E+11	2.E+11	3049340	8028290	0.895	0.369	0.523	197147	2773	110.796	159.204	89.987
107.95	24.606	128.014	-4797.93	-10654.2	0.226	1008406	1790187	37.164	2.E+12	9.E+11	5469720	1.E+07	0.948	0.289	0.361	830724	11685	114.244	155.756	89.999
114.299	24.606	128.014	0.137	0.015	0.830	3.213	5.545	7.059	45.451	1.561	1.910	2.456	0.173	0.167	0.124	59.790	0.841	80.590	88.992	9.464
120.65	24.606	128.014	-1108.57	-2696.75	0.549	374459	730401	39.639	3.E+11	1.E+11	3079160	7489560	0.885	0.410	0.512	207293	2916	112.346	157.654	89.989
127	24.606	128.014	-4481.82	-9981.91	0.141	970910	1719245	30.919	2.E+12	8.E+11	3193380	7112080	0.947	0.210	0.265	777917	10942	114.180	155.820	89.999
133.349	24.606	128.014	-1370.54	-2635.48	0.724	630506	1139400	25.294	8.E+11	4.E+11	5012680	9638320	0.984	0.622	0.662	211192	2971	117.476	152.524	89.986
139.699	24.606	128.014	-284.154	-1113.09	0.188	258323	474938	34.044	1.E+11	5.E+10	270429	1058860	0.754	0.061	0.130	81674	1149	104.321	165.679	89.991
146.05	24.606	128.014	-597.997	-1491.10	0.636	307818	585130	31.926	2.E+11	8.E+10	1923770	4796050	0.883	0.387	0.508	114218	1607	111.853	158.147	89.977
152.4	24.606	128.014	-1842.16	-4285.12	0.442	588541	1076152	34.639	8.E+11	3.E+11	3051498	7106279	0.957	0.335	0.420	331920	4669	112.017	161.723	92.238

Station 11: Location 7 raw data file: 51711453.xls

Vref= 71.2293

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	11.906	128.014	-647.9	-2212.9	0.1	401140	740402	29.1	4.E+11	1.E+11	483573	1651820	0.8	0.1	0.2	164242	2305.8	106.3	163.7	90.0
6.349	11.906	128.014	-676.6	-1813.7	0.5	350681	637154	31.9	3.E+11	1.E+11	1885130	5053440	0.9	0.3	0.5	137888	1935.8	110.5	159.5	90.0
12.699	11.906	128.014	41.8	-137.4	0.7	107859	173745	16.1	2.E+10	4.E+09	-151101	497169	0.4	-0.2	0.4	10232.9	143.7	73.1	163.1	89.7
19.05	11.906	128.014	-1736.4	-4858.9	0.1	598733	1038909	20.1	7.E+11	3.E+11	500635	1400930	0.9	0.1	0.1	367530	5159.8	109.7	160.3	90.0
25.399	11.906	128.014	-2603.2	-6221.1	0.0	590363	1094157	17.5	8.E+11	3.E+11	512787	1225430	0.9	0.1	0.1	480356	6743.8	112.7	157.3	90.0
31.75	11.906	128.014	0.1	0.1	0.8	8.7	9.8	11.7	154.6	-11.2	-26.4	-12.4	-0.3	-0.5	-0.2	57.7	0.8	85.3	81.6	9.6
38.1	11.906	128.014	0.1	0.0	0.4	10.9	20.0	18.9	436.8	38.3	11.4	14.9	0.3	0.1	0.1	32.0	0.4	72.3	96.1	18.8
44.45	11.906	128.014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.799	11.906	128.014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57.149	11.906	128.014	0.0	-0.1	0.6	6.2	9.9	10.1	119.6	-1.6	-1.2	4.5	-0.1	0.0	0.1	45.4	0.6	89.9	95.6	5.6
63.5	11.906	128.014	0.0	0.0	0.7	4.4	7.7	8.9	78.5	1.4	0.9	1.6	0.1	0.0	0.0	49.3	0.7	92.2	92.5	3.4
69.849	11.906	128.014	0.0	0.0	0.7	4.6	7.7	9.4	83.6	2.2	5.1	3.3	0.1	0.2	0.1	50.8	0.7	91.0	91.3	1.7
76.2	11.906	128.014	0.0	0.0	0.7	4.5	7.5	8.6	75.8	1.2	5.0	4.9	0.1	0.3	0.1	51.2	0.7	90.1	91.1	1.1
82.549	11.906	128.014	0.0	0.0	0.7	4.7	7.5	8.2	72.6	2.6	2.9	5.4	0.1	0.2	0.2	51.5	0.7	89.0	90.9	1.4
88.9	11.906	128.014	-1188.7	-3006.9	0.5	510326	946895	36.4	6.E+11	2.E+11	2842520	7189970	0.9	0.3	0.4	230309	3233.3	111.6	158.4	90.0
95.25	11.906	128.014	-567.2	-1958.6	0.4	355238	681676	38.4	3.E+11	1.E+11	1158510	4000520	0.9	0.2	0.3	145243	2039.1	106.2	163.9	90.0
101.599	11.906	128.014	0.0	0.0	0.8	4.3	7.5	7.9	68.5	2.1	2.3	3.5	0.1	0.1	0.1	54.1	0.8	87.1	89.0	3.1
107.95	11.906	128.014	-1428.7	-3477.8	0.4	493630	899063	37.7	5.E+11	2.E+11	3227820	7857350	0.9	0.3	0.5	267810	3759.8	112.3	157.7	90.0
114.299	11.906	128.014	0.1	0.0	0.8	4.8	8.0	7.8	73.2	2.5	3.8	4.9	0.1	0.2	0.2	53.8	0.8	85.5	89.3	4.6
120.65	11.906	128.014	-3289.9	-7568.3	0.2	840535	1509060	34.9	1.5E+12	6.E+11	4105360	9444230	0.9	0.3	0.4	587816	8252.4	113.5	156.5	90.0
127	11.906	128.014	0.1	0.0	0.7	5.5	9.1	8.8	95.3	2.0	6.3	7.0	0.1	0.3	0.2	51.4	0.7	85.5	88.2	4.8
133.349	11.906	128.014	0.0	0.0	0.7	5.5	9.1	7.5	85.1	-0.7	4.7	5.3	0.0	0.2	0.2	50.3	0.7	86.4	86.5	5.0
139.699	11.906	128.014	0.0	0.1	0.7	5.4	9.3	7.3	84.2	0.5	3.9	5.1	0.0	0.2	0.1	50.6	0.7	87.3	85.9	4.9
146.05	11.906	128.014	0.0	0.1	0.7	5.0	8.3	5.9	64.1	1.4	3.1	5.9	0.1	0.2	0.2	51.2	0.7	88.4	85.7	4.5
152.4	11.906	128.014	0.0	0.0	0.7	4.6	8.4	6.0	64.3	-1.6	2.1	4.3	-0.1	0.2	0.2	51.8	0.7	88.6	86.3	4.0


Station 12 Survey
127.00
101.60
76.20
50.80
37.30
24.60
11.50
5.55
2.38
Unable to survey locations
4.78 and 4.90
(colorlink saturation)
Station 12
(z=134.111)
0.0
19.05
38.1
57.15
76.2
95.25
114.3
133.35
152.4
Z'Axis
Survey Station (mm)
From Leading Edge of Blade #3
Y'Axis
Survey Location (mm)
From Centerline to North Wall
Z'
Y'
X'
X'Axis
Survery Positon (every 6.35mm or 1/4in)
From Leading Edge of Blade #3 to Leading Edge of Blade #4

Station 12: Location 1 (centerline) raw data file: 050312_0.xls

Vref= 70.9437

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	127	134.111	0.150	-0.013	0.883	1.920	3.065	2.335	9.268	0.042	0.523	0.599	0.014	0.232	0.166	63.602	0.896	80.335	90.860	9.704
6.349	127	134.111	0.144	-0.014	0.878	1.913	2.931	4.709	17.214	0.222	0.533	0.365	0.079	0.117	0.052	63.149	0.890	80.718	90.898	9.326
12.699	127	134.111	0.135	-0.008	0.893	1.972	3.002	1.822	8.110	0.036	0.423	0.295	0.012	0.234	0.107	64.109	0.903	81.417	90.496	8.598
19.05	127	134.111	0.122	-0.008	0.905	2.116	3.225	4.219	16.339	0.123	0.611	0.350	0.036	0.136	0.051	64.785	0.913	82.299	90.488	7.717
25.399	127	134.111	0.111	-0.016	0.916	2.380	3.658	5.333	23.746	-0.004	0.238	0.449	-0.001	0.037	0.046	65.480	0.923	83.120	90.975	6.950
31.75	127	134.111	0.111	-0.018	0.880	4.315	6.975	9.928	82.922	1.706	0.471	-0.368	0.112	0.022	-0.011	62.981	0.887	82.800	91.187	7.298
38.1	127	134.111	0.021	-0.012	0.218	13.312	23.801	17.632	527.274	14.324	20.580	21.214	0.090	0.174	0.100	15.575	0.219	84.455	93.044	6.330
44.45	127	134.111	-0.040	-0.002	0.058	11.108	18.927	12.198	315.212	13.835	3.404	0.738	0.131	0.050	0.006	5.013	0.071	124.054	91.730	34.111
50.799	127	134.111	-0.023	-0.001	0.054	11.320	17.928	11.637	292.485	21.226	-0.657	-1.219	0.208	-0.010	-0.012	4.160	0.059	113.280	91.102	23.309
57.149	127	134.111	0.017	-0.028	0.123	12.360	21.195	15.453	420.393	20.344	-3.576	-5.458	0.154	-0.037	-0.033	9.063	0.128	82.126	102.523	14.862
63.5	127	134.111	0.065	-0.013	0.325	13.203	22.799	21.678	582.017	26.433	-4.403	-17.450	0.174	-0.031	-0.070	23.526	0.331	78.747	92.182	11.468
69.849	127	134.111	0.112	-0.007	0.599	11.341	19.216	22.844	509.862	18.912	-15.103	-27.479	0.172	-0.116	-0.124	43.238	0.609	79.382	90.644	10.638
76.2	127	134.111	0.170	-0.001	0.788	7.983	12.993	14.055	215.037	7.139	-6.166	-6.938	0.137	-0.109	-0.075	57.200	0.806	77.856	90.086	12.144
82.549	127	134.111	0.191	0.000	0.866	5.278	8.923	9.013	94.359	-1.651	-1.338	-2.927	-0.070	-0.056	-0.072	62.922	0.887	77.536	90.014	12.464
88.9	127	134.111	0.192	0.012	0.897	3.482	5.261	5.116	32.986	-0.949	-0.812	-0.718	-0.103	-0.091	-0.053	65.084	0.917	77.930	89.251	12.094
95.25	127	134.111	0.187	0.006	0.900	2.386	3.564	3.360	14.841	-0.084	0.317	-0.277	-0.020	0.079	-0.046	65.278	0.920	78.244	89.645	11.761
101.599	127	134.111	0.183	0.001	0.892	2.068	3.081	3.311	12.365	-0.092	0.288	-0.056	-0.029	0.083	-0.011	64.665	0.911	78.384	89.921	11.616
107.95	127	134.111	0.180	0.000	0.882	1.747	2.750	1.762	6.860	0.049	0.173	0.071	0.020	0.112	0.029	63.856	0.900	78.470	89.974	11.530
114.299	127	134.111	0.178	0.002	0.865	1.708	2.483	5.221	18.169	-0.071	0.374	0.117	-0.033	0.083	0.018	62.654	0.883	78.366	89.851	11.635
120.65	127	134.111	0.178	0.000	0.864	1.603	2.525	3.795	11.672	0.021	0.202	0.016	0.010	0.066	0.003	62.621	0.882	78.345	90.011	11.655
127	127	134.111	0.176	-0.001	0.860	1.462	2.408	3.232	9.191	0.019	0.218	0.259	0.011	0.092	0.066	62.328	0.878	78.412	90.069	11.589
133.349	127	134.111	0.176	-0.002	0.858	1.552	2.516	2.820	8.346	-0.066	0.261	0.160	-0.034	0.119	0.045	62.148	0.876	78.437	90.128	11.564
139.699	127	134.111	0.156	0.005	0.842	1.648	2.558	2.704	8.284	-0.166	0.307	0.252	-0.078	0.137	0.072	60.752	0.856	79.498	89.698	10.506
146.05	127	134.111	0.150	-0.001	0.844	1.545	2.576	2.638	7.990	0.167	0.341	0.239	0.083	0.166	0.070	60.811	0.857	79.911	90.036	10.089
152.4	127	134.111	0.144	-0.002	0.847	1.567	2.602	2.341	7.354	0.098	0.303	0.492	0.048	0.164	0.160	60.974	0.859	80.337	90.110	9.664

Station 12: Location 2 raw data file: 050312_1.xls

Vref= 71.0817

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	101.6	134.111	0.156	0.001	0.881	1.839	2.706	2.854	9.426	-0.090	0.286	0.319	-0.036	0.108	0.082	63.561	0.894	79.975	89.964	10.025
6.349	101.6	134.111	0.144	-0.003	0.880	1.790	2.727	3.170	10.345	0.172	0.472	0.176	0.070	0.165	0.040	63.402	0.892	80.723	90.169	9.278
12.699	101.6	134.111	0.135	0.000	0.889	1.773	2.854	4.877	17.539	-0.078	0.331	0.377	-0.030	0.076	0.054	63.906	0.899	81.341	90.011	8.659
19.05	101.6	134.111	0.127	0.004	0.904	2.090	3.263	4.271	16.629	0.071	0.097	-0.154	0.021	0.022	-0.022	64.906	0.913	82.035	89.767	7.969
25.399	101.6	134.111	0.123	0.012	0.912	2.141	3.689	5.164	22.428	-0.401	-0.224	0.071	-0.101	-0.040	0.007	65.399	0.920	82.339	89.280	7.695
31.75	101.6	134.111	0.124	0.041	0.883	3.265	5.302	10.243	71.840	0.563	-0.434	0.535	0.064	-0.026	0.019	63.474	0.893	81.998	87.350	8.435
38.1	101.6	134.111	0.045	-0.034	0.253	13.102	21.842	16.955	468.117	28.831	19.194	19.017	0.199	0.171	0.102	18.446	0.260	79.924	97.625	12.684
44.45	101.6	134.111	-0.015	-0.120	0.040	10.033	17.835	11.229	272.404	-4.355	1.801	-1.661	-0.048	0.032	-0.016	9.043	0.127	96.955	160.524	71.902
50.799	101.6	134.111	0.010	-0.068	0.050	11.096	19.175	11.588	312.540	6.151	-2.844	-2.501	0.057	-0.044	-0.022	6.051	0.085	83.143	142.772	53.623
57.149	101.6	134.111	0.052	-0.024	0.170	12.733	22.009	17.318	473.213	19.423	-6.959	-16.417	0.137	-0.062	-0.085	12.775	0.180	73.115	97.583	18.604
63.5	101.6	134.111	0.096	0.018	0.422	12.183	20.361	23.917	567.521	9.169	-8.663	-26.157	0.073	-0.059	-0.106	30.809	0.433	77.202	87.567	13.035
69.849	101.6	134.111	0.143	0.025	0.686	9.690	16.490	19.341	369.943	7.943	-4.420	-7.922	0.098	-0.047	-0.049	49.856	0.701	78.248	87.997	11.926
76.2	101.6	134.111	0.176	0.043	0.812	6.497	10.498	14.514	181.534	6.333	-2.732	-0.117	0.184	-0.057	-0.002	59.150	0.832	77.761	87.051	12.600
82.549	101.6	134.111	0.187	0.042	0.882	3.909	6.570	6.997	53.701	3.318	-0.858	-2.632	0.256	-0.062	-0.113	64.134	0.902	78.039	87.323	12.265
88.9	101.6	134.111	0.188	0.034	0.902	2.725	4.090	5.641	27.983	0.676	-0.351	0.307	0.120	-0.045	0.026	65.507	0.922	78.206	87.915	11.982
95.25	101.6	134.111	0.189	0.026	0.907	2.207	3.640	2.815	13.022	0.422	0.234	-0.006	0.104	0.075	-0.001	65.884	0.927	78.211	88.364	11.905
101.599	101.6	134.111	0.180	0.020	0.903	1.755	2.875	2.386	8.519	0.056	0.170	-0.100	0.022	0.080	-0.029	65.455	0.921	78.756	88.768	11.313
107.95	101.6	134.111	0.180	0.015	0.896	1.637	2.678	2.400	7.807	0.158	0.084	0.150	0.072	0.042	0.046	64.968	0.914	78.674	89.029	11.369
114.299	101.6	134.111	0.179	0.011	0.885	1.769	2.728	3.041	9.908	0.263	0.496	0.571	0.108	0.183	0.136	64.203	0.903	78.558	89.312	11.463
120.65	101.6	134.111	0.178	0.009	0.876	1.603	2.504	3.152	9.387	0.061	0.355	0.133	0.030	0.139	0.033	63.566	0.894	78.532	89.392	11.484
127	101.6	134.111	0.173	0.007	0.869	1.749	2.534	1.913	6.570	0.110	0.485	0.447	0.049	0.287	0.183	63.023	0.887	78.716	89.522	11.295
133.349	101.6	134.111	0.169	0.011	0.865	1.714	2.566	3.428	10.637	0.262	0.583	0.598	0.118	0.196	0.135	62.646	0.881	78.953	89.269	11.072
139.699	101.6	134.111	0.165	0.013	0.862	1.674	2.673	2.381	7.809	0.151	0.360	0.521	0.067	0.179	0.162	62.407	0.878	79.139	89.151	10.896
146.05	101.6	134.111	0.161	0.013	0.861	1.662	2.649	2.594	8.256	0.072	0.406	0.303	0.032	0.186	0.087	62.274	0.876	79.403	89.159	10.631
152.4	101.6	134.111	0.154	0.017	0.862	1.658	2.674	2.351	7.712	0.086	0.396	0.258	0.038	0.201	0.081	62.276	0.876	79.849	88.910	10.211

Station 12: Location 3

raw data file: 050312_2.xls

Vref= 71.2293

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	76.2	134.111	0.160	0.014	0.873	1.828	2.895	1.702	7.308	-0.071	0.317	0.455	-0.026	0.201	0.182	63.197	0.887	79.629	89.086	10.413
6.349	76.2	134.111	0.152	0.010	0.878	1.883	2.736	2.279	8.113	-0.050	0.297	0.109	-0.019	0.136	0.035	63.478	0.891	80.165	89.342	9.857
12.699	76.2	134.111	0.144	0.014	0.883	1.915	2.954	1.692	7.628	0.014	0.274	0.151	0.005	0.167	0.060	63.710	0.894	80.742	89.103	9.303
19.05	76.2	134.111	0.136	0.015	0.892	1.967	3.167	3.296	12.384	-0.076	0.085	0.845	-0.024	0.026	0.159	64.278	0.902	81.322	89.072	8.729
25.399	76.2	134.111	0.134	0.015	0.910	1.996	3.484	3.952	15.870	0.123	0.086	-0.232	0.035	0.022	-0.033	65.528	0.920	81.616	89.043	8.440
31.75	76.2	134.111	0.150	0.025	0.864	3.223	5.164	9.006	59.086	-0.825	-0.831	-1.532	-0.098	-0.056	-0.065	62.460	0.877	80.136	88.363	10.002
38.1	76.2	134.111	0.091	-0.142	0.392	12.926	22.019	19.230	510.870	40.676	16.015	22.380	0.282	0.127	0.104	30.398	0.427	77.646	109.378	23.254
44.45	76.2	134.111	-0.019	-0.180	0.153	11.060	18.132	15.537	346.245	-11.202	-5.234	1.419	-0.110	-0.060	0.010	16.893	0.237	94.488	139.489	49.844
50.799	76.2	134.111	0.019	-0.048	0.310	11.438	20.020	19.603	457.965	-2.404	-3.100	-24.026	-0.021	-0.027	-0.121	22.374	0.314	86.580	98.875	9.521
57.149	76.2	134.111	0.066	-0.009	0.573	10.018	16.945	22.160	439.277	-8.278	0.619	9.388	-0.096	0.005	0.049	41.107	0.577	83.425	90.941	6.643
63.5	76.2	134.111	0.099	0.029	0.728	7.938	13.764	21.315	353.391	12.067	-7.512	-3.433	0.218	-0.088	-0.023	52.339	0.735	82.257	87.735	8.071
69.849	76.2	134.111	0.121	0.034	0.862	4.409	7.684	11.832	109.238	8.388	-3.749	-2.754	0.488	-0.142	-0.060	62.045	0.871	82.001	87.774	8.307
76.2	76.2	134.111	0.136	0.021	0.913	2.482	3.899	5.346	24.974	1.551	0.030	0.061	0.316	0.004	0.006	65.781	0.924	81.529	88.677	8.575
82.549	76.2	134.111	0.132	-0.008	0.884	3.780	6.779	9.094	71.473	8.138	5.908	13.906	0.626	0.339	0.445	63.683	0.894	81.479	90.544	8.538
88.9	76.2	134.111	0.156	0.021	0.912	2.002	3.058	2.859	10.766	0.524	0.407	0.251	0.169	0.140	0.056	65.917	0.925	80.300	88.694	9.789
95.25	76.2	134.111	0.164	0.021	0.904	1.887	2.828	3.042	10.408	0.124	0.613	0.213	0.046	0.211	0.049	65.457	0.919	79.732	88.698	10.353
101.599	76.2	134.111	0.172	0.025	0.903	1.802	2.867	1.658	7.108	0.432	0.309	0.424	0.165	0.204	0.176	65.469	0.919	79.225	88.412	10.895
107.95	76.2	134.111	0.174	0.024	0.892	1.695	2.570	2.749	8.518	0.305	0.307	0.194	0.138	0.130	0.054	64.777	0.909	78.984	88.481	11.123
114.299	76.2	134.111	0.176	0.019	0.884	1.591	2.610	2.381	7.505	0.127	0.184	0.160	0.060	0.096	0.051	64.231	0.902	78.729	88.781	11.338
120.65	76.2	134.111	0.175	0.014	0.877	1.688	2.777	2.603	8.670	0.171	0.327	0.335	0.072	0.147	0.091	63.712	0.894	78.692	89.095	11.345
127	76.2	134.111	0.173	0.012	0.872	1.669	2.648	1.630	6.229	-0.097	0.259	0.294	-0.043	0.188	0.134	63.343	0.889	78.755	89.217	11.273
133.349	76.2	134.111	0.169	0.017	0.866	1.599	2.780	1.723	6.626	-0.245	0.294	0.312	-0.109	0.210	0.129	62.856	0.882	78.969	88.892	11.088
139.699	76.2	134.111	0.163	0.023	0.864	1.695	2.927	1.757	7.264	-0.228	0.328	0.209	-0.091	0.217	0.080	62.637	0.879	79.313	88.481	10.798
146.05	76.2	134.111	0.159	0.024	0.861	1.686	2.717	1.773	6.685	-0.069	0.214	0.389	-0.030	0.141	0.159	62.405	0.876	79.575	88.427	10.545
152.4	76.2	134.111	0.152	0.031	0.862	1.656	2.646	1.783	6.462	-0.246	0.323	0.260	-0.111	0.215	0.109	62.387	0.876	79.989	87.973	10.218

Station 12: Location 4 raw data file: 050312_3.xls

Vref= 71.3631

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	50.799	134.111	0.146	0.028	0.842	3.709	4.592	4.056	25.645	-0.603	2.178	1.507	-0.069	0.284	0.159	61.008	0.855	80.183	88.115	10.000
6.349	50.799	134.111	0.155	0.002	0.850	8.428	13.651	4.712	139.791	-42.197	1.026	9.678	-0.720	0.051	0.295	61.689	0.864	79.676	89.876	10.325
12.699	50.799	134.111	0.129	0.045	0.860	2.848	4.831	3.067	20.428	1.098	1.228	2.118	0.157	0.276	0.281	62.154	0.871	81.474	87.048	9.030
19.05	50.799	134.111	0.122	0.042	0.874	2.519	3.957	2.608	14.401	0.543	0.660	0.691	0.107	0.197	0.131	63.064	0.884	82.045	87.308	8.403
25.399	50.799	134.111	0.113	0.053	0.885	2.500	4.020	2.794	15.107	0.377	0.429	0.546	0.074	0.121	0.095	63.786	0.894	82.716	86.622	8.037
31.75	50.799	134.111	0.111	0.054	0.884	2.883	4.896	6.717	38.698	1.191	0.313	0.283	0.166	0.032	0.017	63.726	0.893	82.889	86.512	7.928
38.1	50.799	134.111	0.086	-0.117	0.333	12.366	21.003	17.371	447.908	34.069	2.361	8.910	0.258	0.022	0.048	25.892	0.363	76.348	108.828	23.567
44.45	50.799	134.111	-0.024	-0.167	0.213	9.603	17.023	14.039	289.545	-7.168	3.924	7.357	-0.086	0.057	0.060	19.402	0.272	95.096	127.811	38.277
50.799	50.799	134.111	0.025	-0.061	0.648	6.986	12.312	17.999	262.179	4.097	-3.402	-1.845	0.094	-0.053	-0.016	46.466	0.651	87.787	95.402	5.840
57.149	50.799	134.111	0.053	-0.045	0.898	2.755	4.594	5.627	30.175	1.071	-0.696	-0.740	0.166	-0.088	-0.056	64.258	0.900	86.609	92.847	4.430
63.5	50.799	134.111	0.083	-0.037	0.857	3.877	6.950	14.360	134.768	2.349	-0.637	2.637	0.171	-0.022	0.052	61.472	0.861	84.458	92.429	6.054
69.849	50.799	134.111	0.092	-0.018	0.895	2.319	3.821	3.044	14.623	-0.153	0.486	-1.026	-0.034	0.135	-0.173	64.216	0.900	84.117	91.144	5.994
76.2	50.799	134.111	0.111	-0.014	0.888	2.211	3.495	3.890	16.120	0.144	0.486	0.507	0.037	0.111	0.073	63.902	0.895	82.863	90.868	7.190
82.549	50.799	134.111	0.127	-0.008	0.895	2.304	3.757	2.888	13.882	-0.646	0.642	0.723	-0.146	0.189	0.131	64.547	0.904	81.902	90.508	8.114
88.9	50.799	134.111	0.135	-0.002	0.882	2.513	3.524	2.971	13.780	0.388	0.708	1.220	0.086	0.186	0.229	63.660	0.892	81.318	90.156	8.683
95.25	50.799	134.111	0.149	0.007	0.882	1.986	3.118	2.506	9.974	0.287	0.707	0.987	0.091	0.279	0.248	63.854	0.895	80.409	89.562	9.601
101.599	50.799	134.111	0.158	0.014	0.884	1.874	3.070	2.384	9.309	0.306	0.570	0.904	0.105	0.250	0.243	64.066	0.898	79.860	89.128	10.178
107.95	50.799	134.111	0.161	0.016	0.879	1.743	2.887	2.095	7.881	0.181	0.231	0.407	0.071	0.124	0.132	63.764	0.894	79.604	88.955	10.450
114.299	50.799	134.111	0.166	0.020	0.877	1.765	2.893	1.778	7.323	0.229	0.381	0.364	0.088	0.238	0.139	63.718	0.893	79.288	88.693	10.794
120.65	50.799	134.111	0.165	0.018	0.869	1.814	2.973	1.758	7.609	0.047	0.270	0.440	0.017	0.166	0.165	63.132	0.885	79.261	88.820	10.805
127	50.799	134.111	0.163	0.019	0.862	1.810	2.979	1.999	8.073	-0.152	0.274	0.343	-0.055	0.149	0.113	62.633	0.878	79.310	88.785	10.760
133.349	50.799	134.111	0.159	0.022	0.862	1.798	2.940	1.926	7.792	-0.185	0.229	0.259	-0.069	0.130	0.090	62.570	0.877	79.519	88.587	10.578
139.699	50.799	134.111	0.160	0.037	0.868	1.820	2.887	2.074	7.976	-0.172	0.429	0.518	-0.064	0.223	0.170	63.023	0.883	79.538	87.629	10.733
146.05	50.799	134.111	0.155	0.045	0.866	1.860	3.013	2.006	8.281	0.169	0.508	0.596	0.059	0.267	0.194	62.874	0.881	79.859	87.070	10.564
152.4	50.799	134.111	0.156	0.041	0.864	2.948	3.666	2.234	13.563	-0.899	0.622	1.014	-0.163	0.186	0.243	62.721	0.879	79.779	87.324	10.573

Station 12: Location 5 raw data file: 50312353.xls

Vref= 71.4299

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	37.306	134.111	0.134	0.047	0.811	2.485	4.355	3.932	20.303	0.215	0.850	1.713	0.039	0.171	0.196	58.801	0.823	80.645	86.717	9.924
6.349	37.306	134.111	0.135	0.052	0.823	2.738	4.583	3.911	21.899	-0.571	0.846	1.016	-0.089	0.155	0.111	59.697	0.836	80.704	86.440	9.966
12.699	37.306	134.111	0.132	0.064	0.844	2.813	4.502	3.383	19.815	-0.850	0.195	1.246	-0.132	0.040	0.160	61.190	0.857	81.153	85.740	9.834
19.05	37.306	134.111	0.125	0.076	0.857	2.562	4.135	3.544	18.112	0.611	0.768	0.541	0.113	0.166	0.072	62.099	0.869	81.735	84.955	9.702
25.399	37.306	134.111	0.127	0.079	0.875	4.256	4.940	5.489	36.323	-0.504	-1.760	2.149	-0.047	-0.148	0.155	63.437	0.888	81.801	84.905	9.671
31.75	37.306	134.111	0.128	0.086	0.874	3.820	5.856	8.284	58.751	-1.869	-1.493	7.232	-0.164	-0.092	0.292	63.396	0.888	81.681	84.430	10.033
38.1	37.306	134.111	0.110	-0.100	0.388	12.253	21.485	18.232	472.085	47.091	10.142	21.769	0.351	0.089	0.109	29.691	0.416	74.670	103.905	20.933
44.45	37.306	134.111	-0.039	-0.169	0.222	8.144	14.667	13.973	238.346	-10.017	0.929	-0.164	-0.164	0.016	-0.002	20.134	0.282	97.936	126.929	38.060
50.799	37.306	134.111	0.013	-0.068	0.660	7.446	12.089	16.235	232.578	2.509	-2.899	-7.527	0.055	-0.047	-0.075	47.417	0.664	88.889	95.874	5.979
57.149	37.306	134.111	0.052	-0.048	0.860	2.957	4.718	6.071	33.932	1.354	0.057	0.461	0.190	0.006	0.032	61.618	0.863	86.546	93.186	4.701
63.5	37.306	134.111	0.085	-0.029	0.868	2.270	3.539	4.683	19.805	0.533	0.398	0.435	0.130	0.073	0.051	62.352	0.873	84.381	91.928	5.942
69.849	37.306	134.111	0.102	-0.022	0.871	2.299	3.627	3.038	13.837	0.295	0.424	0.582	0.069	0.119	0.104	62.693	0.878	83.323	91.466	6.838
76.2	37.306	134.111	0.119	-0.022	0.862	2.443	4.121	3.022	16.042	1.019	0.168	0.157	0.198	0.045	0.025	62.143	0.870	82.167	91.457	7.969
82.549	37.306	134.111	0.128	-0.019	0.849	2.871	4.528	5.203	27.912	-0.116	1.139	2.982	-0.018	0.149	0.248	61.331	0.859	81.409	91.262	8.684
88.9	37.306	134.111	0.139	-0.015	0.850	2.409	4.000	3.256	16.202	0.247	0.946	0.993	0.050	0.236	0.149	61.544	0.862	80.739	90.967	9.312
95.25	37.306	134.111	0.138	0.000	0.855	2.438	3.968	3.310	16.322	0.534	0.918	1.399	0.108	0.223	0.209	61.862	0.866	80.847	90.024	9.153
101.599	37.306	134.111	0.138	0.009	0.863	2.530	3.978	3.327	16.649	0.873	1.258	1.062	0.170	0.293	0.157	62.451	0.874	80.902	89.428	9.116
107.95	37.306	134.111	0.148	0.010	0.862	2.716	4.206	3.010	17.067	1.165	1.272	1.393	0.200	0.305	0.216	62.487	0.875	80.266	89.375	9.755
114.299	37.306	134.111	0.153	0.016	0.858	2.676	4.267	3.181	17.745	0.324	1.174	1.201	0.056	0.270	0.173	62.253	0.872	79.903	88.957	10.152
120.65	37.306	134.111	0.150	0.015	0.845	2.615	4.269	3.433	18.428	0.578	1.403	1.689	0.101	0.306	0.226	61.314	0.858	79.962	89.005	10.089
127	37.306	134.111	0.147	0.017	0.837	3.336	4.460	3.692	22.327	0.736	2.620	2.890	0.097	0.417	0.344	60.694	0.850	80.067	88.872	9.998
133.349	37.306	134.111	0.152	0.010	0.830	4.352	6.565	6.642	53.082	-1.231	3.493	4.952	-0.084	0.237	0.223	60.294	0.844	79.635	89.299	10.390
139.699	37.306	134.111	0.146	0.030	0.828	2.283	3.797	3.207	14.956	-0.233	0.411	0.639	-0.053	0.110	0.103	60.089	0.841	79.971	87.989	10.233
146.05	37.306	134.111	0.147	0.047	0.832	3.095	4.256	4.181	22.587	0.587	0.745	0.058	0.087	0.113	0.006	60.465	0.846	80.016	86.791	10.497
152.4	37.306	134.111	0.140	0.045	0.838	2.274	3.666	2.701	12.954	0.143	0.712	0.805	0.034	0.227	0.159	60.748	0.850	80.501	86.991	9.973

Station 12: Location 6 raw data file: 50312403.xls

Vref= 71.4633

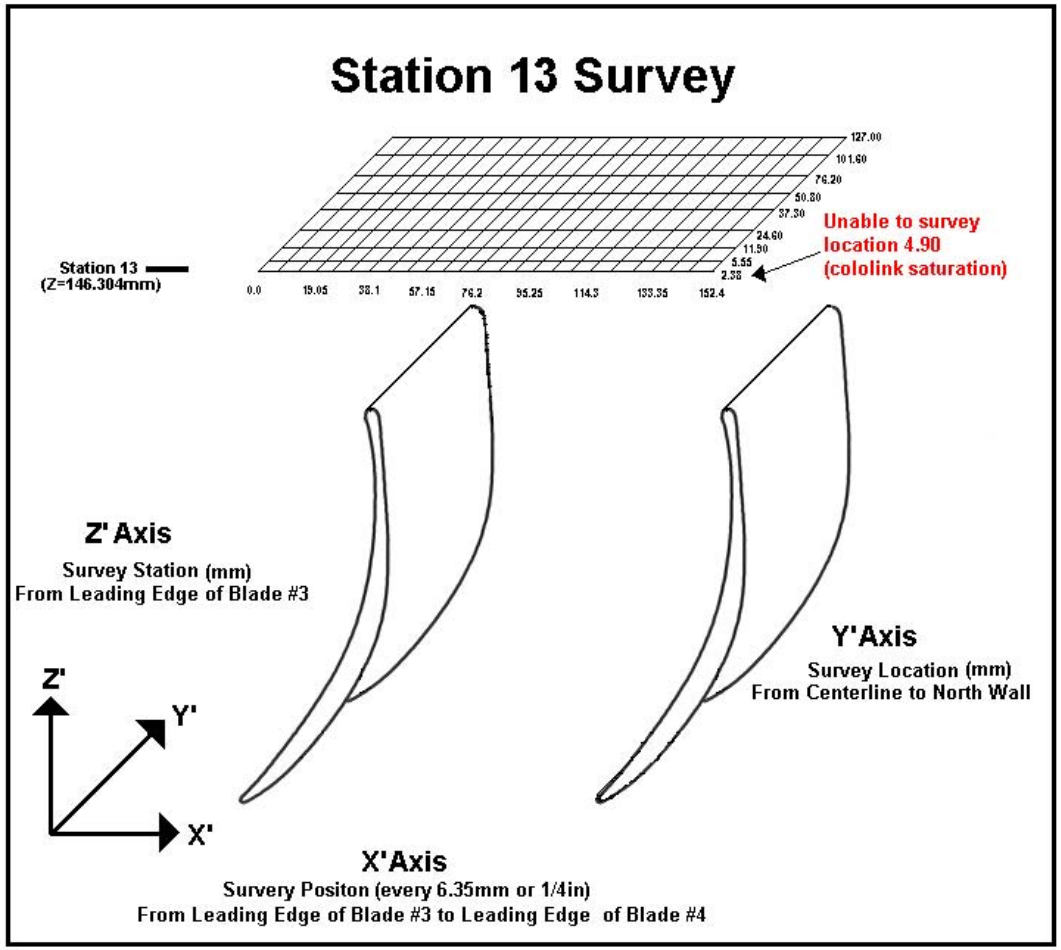
Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	24.606	134.111	0.084	0.040	0.770	3.463	5.326	4.836	31.873	0.631	1.959	2.611	0.067	0.229	0.199	55.412	0.775	83.752	87.030	6.923
6.349	24.606	134.111	0.074	0.049	0.780	3.494	5.497	5.734	37.651	0.825	3.411	0.625	0.084	0.333	0.039	56.076	0.785	84.555	86.398	6.535
12.699	24.606	134.111	0.077	0.057	0.798	3.236	5.048	4.314	27.278	0.981	1.619	2.013	0.118	0.227	0.181	57.416	0.803	84.511	85.901	6.858
19.05	24.606	134.111	0.088	0.046	0.809	4.924	7.033	4.063	45.103	-4.367	1.502	1.127	-0.247	0.147	0.077	58.246	0.815	83.825	86.773	6.973
25.399	24.606	134.111	0.128	0.037	0.835	5.929	10.289	4.593	81.056	-20.583	0.489	2.448	-0.661	0.035	0.101	60.419	0.845	81.297	87.523	9.054
31.75	24.606	134.111	0.131	0.102	0.848	6.332	6.162	5.736	55.481	-1.998	-5.676	1.170	-0.100	-0.306	0.065	61.739	0.864	81.293	83.207	11.076
38.1	24.606	134.111	0.149	-0.049	0.480	12.793	22.115	17.380	477.387	54.121	14.287	24.565	0.375	0.126	0.125	36.099	0.505	72.878	95.602	18.069
44.45	24.606	134.111	-0.030	-0.169	0.306	8.997	15.021	13.744	247.737	-3.247	-2.646	1.986	-0.047	-0.042	0.019	25.093	0.351	94.930	118.720	29.219
50.799	24.606	134.111	0.002	-0.088	0.710	5.311	9.489	12.260	134.283	4.878	-1.467	-5.753	0.190	-0.044	-0.097	51.159	0.716	89.810	97.076	7.079
57.149	24.606	134.111	0.041	-0.070	0.785	3.094	5.220	6.075	36.868	1.448	0.692	1.061	0.176	0.072	0.065	56.390	0.789	86.986	95.079	5.910
63.5	24.606	134.111	0.068	-0.046	0.795	4.463	6.247	10.323	82.754	2.481	-3.298	-2.287	0.174	-0.140	-0.069	57.099	0.799	85.101	93.326	5.926
69.849	24.606	134.111	0.085	-0.033	0.816	3.039	4.808	4.707	27.253	1.074	1.659	2.306	0.144	0.227	0.200	58.701	0.821	84.084	92.285	6.345
76.2	24.606	134.111	0.084	-0.022	0.804	3.117	4.985	4.713	28.390	0.807	1.648	1.170	0.102	0.220	0.097	57.784	0.809	84.002	91.555	6.198
82.549	24.606	134.111	0.087	-0.017	0.802	3.071	4.767	4.637	26.829	0.677	1.650	1.793	0.091	0.227	0.159	57.683	0.807	83.790	91.233	6.333
88.9	24.606	134.111	0.094	-0.005	0.813	2.873	4.602	4.374	24.280	0.411	1.249	1.802	0.061	0.195	0.175	58.455	0.818	83.405	90.315	6.603
95.25	24.606	134.111	0.099	0.000	0.820	2.901	4.685	4.449	25.083	0.956	1.431	1.587	0.138	0.217	0.149	59.024	0.826	83.106	90.012	6.894
101.599	24.606	134.111	0.104	0.007	0.829	2.761	4.203	3.967	20.512	0.768	1.475	1.460	0.130	0.264	0.171	59.682	0.835	82.879	89.523	7.137
107.95	24.606	134.111	0.115	0.013	0.839	2.917	4.537	3.519	20.739	1.394	1.420	2.018	0.206	0.271	0.247	60.489	0.846	82.217	89.143	7.831
114.299	24.606	134.111	0.119	0.015	0.833	2.805	4.581	4.100	22.834	1.362	1.295	1.425	0.208	0.220	0.149	60.160	0.842	81.854	88.955	8.213
120.65	24.606	134.111	0.126	0.015	0.824	2.815	4.591	3.764	21.584	0.548	1.646	1.290	0.083	0.304	0.146	59.546	0.833	81.317	88.995	8.742
127	24.606	134.111	0.125	0.020	0.816	2.989	4.769	3.726	22.784	0.742	1.880	1.897	0.102	0.330	0.209	59.010	0.826	81.328	88.578	8.790
133.349	24.606	134.111	0.124	0.027	0.802	2.917	4.826	4.125	24.407	0.168	1.688	1.855	0.023	0.275	0.182	58.032	0.812	81.203	88.066	9.011
139.699	24.606	134.111	0.120	0.037	0.791	3.064	4.869	3.931	24.270	0.025	1.617	1.587	0.003	0.263	0.162	57.260	0.801	81.411	87.382	8.985
146.05	24.606	134.111	0.113	0.046	0.789	3.181	5.256	4.898	30.865	0.584	1.833	0.599	0.068	0.230	0.046	57.066	0.799	81.900	86.695	8.757
152.4	24.606	134.111	0.110	0.049	0.802	2.988	5.093	3.736	24.412	0.905	1.571	1.691	0.116	0.276	0.174	57.993	0.812	82.197	86.540	8.545

Station 12: Location 7

raw data file: 50312453.xls

Vref= 71.6164

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	11.906	134.111	-0.005	0.064	0.710	4.065	7.025	5.318	47.077	2.709	1.426	2.030	0.185	0.129	0.106	51.046	0.713	90.395	84.876	5.139
6.349	11.906	134.111	-0.006	0.059	0.731	4.010	6.205	4.481	37.336	1.903	2.325	1.943	0.149	0.252	0.136	52.525	0.733	90.504	85.400	4.628
12.699	11.906	134.111	0.004	0.061	0.736	4.523	6.335	8.668	67.861	0.101	-1.833	1.494	0.007	-0.091	0.053	52.922	0.739	89.675	85.285	4.726
19.05	11.906	134.111	0.014	0.070	0.758	4.268	6.007	5.545	42.528	1.264	-0.874	1.360	0.096	-0.072	0.080	54.564	0.762	88.913	84.692	5.418
25.399	11.906	134.111	0.033	0.076	0.789	5.302	5.586	4.555	40.031	0.728	-0.071	1.426	0.048	-0.006	0.109	56.830	0.794	87.604	84.477	6.023
31.75	11.906	134.111	0.056	0.095	0.813	3.102	5.462	4.278	28.880	-1.485	1.045	-0.250	-0.171	0.153	-0.021	58.778	0.821	86.106	83.378	7.691
38.1	11.906	134.111	0.149	-0.067	0.443	10.891	19.480	15.511	369.351	30.343	3.860	5.563	0.279	0.045	0.036	33.839	0.473	71.564	98.171	20.287
44.45	11.906	134.111	-0.045	-0.143	0.428	5.178	8.526	10.739	107.417	-3.175	-2.519	-0.145	-0.140	-0.088	-0.003	32.492	0.454	95.714	108.431	19.358
50.799	11.906	134.111	-0.031	-0.084	0.588	4.340	7.658	9.664	85.429	0.987	-1.113	0.570	0.058	-0.052	0.015	42.572	0.594	93.017	98.139	8.687
57.149	11.906	134.111	-0.023	-0.050	0.642	4.396	7.331	8.223	70.344	0.989	0.498	1.143	0.060	0.027	0.037	46.136	0.644	92.002	94.409	4.844
63.5	11.906	134.111	-0.031	-0.035	0.676	5.161	8.028	11.381	110.301	0.727	5.204	-3.371	0.034	0.173	-0.072	48.523	0.678	92.631	92.948	3.953
69.849	11.906	134.111	-0.019	-0.029	0.692	4.215	7.649	8.876	77.528	0.486	3.457	4.473	0.029	0.180	0.128	49.636	0.693	91.536	92.387	2.839
76.2	11.906	134.111	0.004	-0.017	0.705	4.432	7.157	7.821	66.013	1.847	3.931	3.824	0.114	0.221	0.133	50.524	0.705	89.696	91.358	1.391
82.549	11.906	134.111	0.006	-0.005	0.718	4.436	7.401	7.272	63.663	2.070	3.267	3.661	0.123	0.197	0.133	51.390	0.718	89.538	90.372	0.594
88.9	11.906	134.111	0.009	-0.005	0.734	4.333	7.273	7.006	60.384	1.710	3.092	4.554	0.106	0.199	0.174	52.556	0.734	89.306	90.380	0.791
95.25	11.906	134.111	0.018	0.005	0.753	4.296	7.426	6.970	61.093	1.855	2.419	3.698	0.113	0.157	0.139	53.963	0.754	88.640	89.629	1.409
101.599	11.906	134.111	0.027	-0.001	0.753	4.446	7.575	7.084	63.660	3.505	2.904	5.071	0.203	0.180	0.184	53.927	0.753	87.958	90.089	2.044
107.95	11.906	134.111	0.039	0.005	0.753	4.405	7.406	7.555	65.670	2.757	3.451	5.077	0.165	0.202	0.177	54.014	0.754	87.017	89.635	3.005
114.299	11.906	134.111	0.050	0.017	0.741	4.593	7.695	8.349	75.008	0.893	4.302	4.662	0.049	0.219	0.141	53.199	0.743	86.171	88.697	4.045
120.65	11.906	134.111	0.052	0.017	0.722	5.198	8.206	8.349	82.033	1.851	6.854	7.817	0.085	0.308	0.222	51.872	0.724	85.870	88.652	4.345
127	11.906	134.111	0.052	0.024	0.716	5.407	9.151	7.606	85.419	4.075	6.153	10.570	0.161	0.292	0.296	51.409	0.718	85.853	88.116	4.556
133.349	11.906	134.111	0.042	0.036	0.710	5.270	8.646	7.199	77.176	1.379	5.210	5.549	0.059	0.268	0.174	50.970	0.712	86.612	87.113	4.453
139.699	11.906	134.111	0.032	0.050	0.724	4.937	7.965	6.324	63.901	0.665	4.190	3.870	0.033	0.262	0.150	52.043	0.727	87.515	86.026	4.689
146.05	11.906	134.111	0.021	0.058	0.730	4.568	7.849	5.380	55.706	0.529	2.668	3.005	0.029	0.212	0.139	52.445	0.732	88.331	85.465	4.834
152.4	11.906	134.111	0.025	0.054	0.734	5.341	7.657	6.334	63.633	1.919	2.730	2.342	0.092	0.157	0.094	52.776	0.737	88.031	85.759	4.677


Station 13 Survey
127.00
101.60
76.20
50.80
37.50
24.60
11.50
5.55
2.38
Unable to survey
location 4.90
(cololink saturation)
Station 13
(Z=146.304mm)
0.0
19.05
38.1
57.15
76.2
95.25
114.3
133.35
152.4
Z' Axis
Survey Station (mm)
From Leading Edge of Blade #3
Y'Axis
Survey Location (mm)
From Centerline to North Wall
Z'
Y'
X'
X'Axis
Survery Positon (every 6.35mm or 1/4in)
From Leading Edge of Blade #3 to Leading Edge of Blade #4

Station 13: Location 1 (centerline) raw data file: 042513_0 .xls

Vref= 70.9608

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	127	146.304	0.163	-0.013	0.880	1.991	3.211	2.445	10.126	-0.057	0.453	0.329	-0.018	0.185	0.083	63.511	0.895	79.493	90.842	10.542
6.349	127	146.304	0.160	-0.013	0.883	1.950	3.282	1.661	8.666	-0.257	0.308	0.236	-0.080	0.189	0.086	63.690	0.898	79.749	90.810	10.284
12.699	127	146.304	0.159	-0.010	0.887	1.924	3.444	1.709	9.242	0.257	0.176	0.026	0.077	0.106	0.009	63.971	0.901	79.857	90.609	10.162
19.05	127	146.304	0.163	-0.013	0.898	2.106	3.569	1.741	10.102	0.311	0.052	-0.052	0.082	0.028	-0.016	64.799	0.913	79.727	90.795	10.305
25.399	127	146.304	0.172	-0.002	0.897	2.826	4.941	3.087	20.966	0.744	-0.006	0.023	0.106	-0.001	0.003	64.824	0.914	79.150	90.115	10.850
31.75	127	146.304	0.195	0.000	0.857	5.154	8.763	7.777	81.916	3.231	0.359	-0.084	0.142	0.018	-0.002	62.356	0.879	77.205	90.003	12.795
38.1	127	146.304	0.168	-0.010	0.502	12.336	20.956	20.563	507.089	8.750	10.850	10.170	0.067	0.085	0.047	37.572	0.529	71.473	91.037	18.558
44.45	127	146.304	0.068	0.004	0.150	14.085	23.239	15.151	483.992	5.482	7.297	-2.682	0.033	0.068	-0.015	11.671	0.164	65.462	88.591	24.584
50.799	127	146.304	0.009	-0.001	0.064	12.448	21.068	11.915	370.389	3.005	-4.607	-12.524	0.023	-0.062	-0.099	4.605	0.065	82.261	91.176	7.829
57.149	127	146.304	0.023	0.002	0.116	12.545	20.416	14.940	398.691	10.358	-1.663	-5.243	0.080	-0.018	-0.034	8.396	0.118	78.709	88.807	11.356
63.5	127	146.304	0.034	0.001	0.276	12.295	21.630	20.527	520.182	7.788	-2.652	-14.849	0.058	-0.021	-0.066	19.758	0.278	83.008	89.821	6.994
69.849	127	146.304	0.064	-0.003	0.485	12.044	20.149	23.164	543.807	3.026	-1.346	20.663	0.025	-0.010	0.088	34.734	0.489	82.431	90.319	7.576
76.2	127	146.304	0.122	0.001	0.666	9.914	16.769	19.578	381.387	-4.297	-3.508	1.089	-0.051	-0.036	0.007	48.029	0.677	79.610	89.939	10.391
82.549	127	146.304	0.138	0.002	0.812	6.268	10.284	12.549	151.253	-1.659	-3.739	-1.386	-0.051	-0.094	-0.021	58.428	0.823	80.337	89.882	9.664
88.9	127	146.304	0.142	0.015	0.869	4.109	7.072	5.858	50.602	-0.631	-0.811	-0.129	-0.043	-0.067	-0.006	62.524	0.881	80.695	89.004	9.359
95.25	127	146.304	0.151	0.011	0.885	3.156	5.204	3.416	24.356	-1.432	0.461	0.158	-0.173	0.085	0.018	63.707	0.898	80.315	89.289	9.712
101.599	127	146.304	0.157	0.010	0.884	2.561	3.967	2.954	15.512	-0.704	0.218	-0.053	-0.138	0.057	-0.009	63.730	0.898	79.943	89.380	10.076
107.95	127	146.304	0.158	0.005	0.878	2.103	3.278	2.010	9.604	-0.142	0.422	0.166	-0.041	0.198	0.050	63.270	0.892	79.800	89.647	10.206
114.299	127	146.304	0.162	0.004	0.864	1.975	3.142	6.107	25.535	-0.118	0.191	0.125	-0.038	0.032	0.013	62.364	0.879	79.381	89.759	10.622
120.65	127	146.304	0.161	0.004	0.865	1.777	2.991	1.835	7.734	-0.372	0.163	-0.112	-0.139	0.100	-0.041	62.438	0.880	79.451	89.713	10.554
127	127	146.304	0.160	0.007	0.857	1.657	2.910	1.784	7.197	-0.302	0.106	-0.021	-0.125	0.071	-0.008	61.853	0.872	79.413	89.571	10.596
133.349	127	146.304	0.158	0.006	0.856	1.710	2.801	1.863	7.121	-0.039	0.180	0.153	-0.016	0.112	0.058	61.791	0.871	79.543	89.594	10.465
139.699	127	146.304	0.154	0.008	0.851	1.671	2.771	1.737	6.743	-0.116	0.101	0.215	-0.050	0.069	0.089	61.336	0.864	79.737	89.463	10.278
146.05	127	146.304	0.144	0.003	0.858	1.573	2.405	1.684	5.547	0.036	0.260	-0.117	0.019	0.195	-0.058	61.776	0.871	80.450	89.831	9.551
152.4	127	146.304	0.145	-0.001	0.861	1.568	2.431	1.667	5.572	-0.150	0.325	0.150	-0.078	0.247	0.073	61.962	0.873	80.449	90.073	9.552

Station 13: Location 2

raw data file:042613_1 .xls

Vref= 70.7520

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	101.6	146.304	0.165	-0.001	0.885	1.760	3.011	2.058	8.199	-0.076	0.066	0.048	-0.029	0.037	0.016	63.694	0.900	79.410	90.075	10.590
6.349	101.6	146.304	0.162	-0.001	0.879	1.931	3.163	5.408	21.492	-0.271	0.473	0.247	-0.089	0.090	0.029	63.236	0.894	79.570	90.077	10.431
12.699	101.6	146.304	0.159	0.003	0.884	1.824	3.110	3.549	12.799	-0.400	0.161	0.104	-0.141	0.050	0.019	63.576	0.899	79.832	89.822	10.169
19.05	101.6	146.304	0.162	0.009	0.893	2.022	3.421	2.930	12.188	-0.285	0.147	0.298	-0.082	0.050	0.059	64.202	0.907	79.742	89.426	10.274
25.399	101.6	146.304	0.169	0.017	0.901	2.582	4.290	3.402	18.321	-0.066	-0.033	-0.248	-0.012	-0.008	-0.034	64.868	0.917	79.400	88.911	10.657
31.75	101.6	146.304	0.199	0.042	0.884	4.158	7.212	7.048	59.486	0.604	0.431	-0.006	0.040	0.029	0.000	64.159	0.907	77.329	87.326	12.959
38.1	101.6	146.304	0.201	-0.032	0.599	11.447	18.721	19.538	431.616	31.840	4.086	0.985	0.297	0.036	0.005	44.797	0.633	71.445	92.921	18.800
44.45	101.6	146.304	0.095	-0.115	0.179	13.713	23.398	15.699	490.982	27.425	3.475	6.456	0.171	0.032	0.035	16.485	0.233	65.983	119.475	39.685
50.799	101.6	146.304	0.051	-0.108	0.175	13.096	21.136	16.699	448.532	-7.226	-3.470	5.237	-0.052	-0.032	0.030	14.991	0.212	76.069	120.694	34.359
57.149	101.6	146.304	0.048	-0.070	0.322	12.626	21.545	21.435	541.538	-12.737	-3.975	2.370	-0.094	-0.029	0.010	23.520	0.332	81.695	102.075	14.727
63.5	101.6	146.304	0.069	-0.005	0.523	12.115	21.147	23.774	579.571	5.109	5.706	3.075	0.040	0.040	0.012	37.354	0.528	82.535	90.540	7.485
69.849	101.6	146.304	0.089	0.032	0.753	9.217	14.579	17.502	301.898	2.260	0.410	0.434	0.034	0.005	0.003	53.718	0.759	83.293	87.550	7.144
76.2	101.6	146.304	0.117	0.032	0.857	5.747	9.670	9.958	112.856	5.161	0.540	-0.780	0.185	0.019	-0.016	61.237	0.866	82.234	87.861	8.059
82.549	101.6	146.304	0.136	0.030	0.893	3.751	6.013	4.872	36.981	1.908	0.210	-0.390	0.169	0.023	-0.027	63.928	0.904	81.343	88.107	8.865
88.9	101.6	146.304	0.150	0.025	0.898	3.448	5.779	5.124	35.773	4.484	-0.314	-0.702	0.450	-0.035	-0.047	64.457	0.911	80.510	88.439	9.620
95.25	101.6	146.304	0.155	0.015	0.901	2.217	3.607	3.831	16.301	0.616	0.213	0.007	0.154	0.050	0.001	64.725	0.915	80.248	89.034	9.800
101.599	101.6	146.304	0.152	0.015	0.895	1.786	2.905	3.116	10.669	0.080	0.326	-0.022	0.031	0.117	-0.005	64.226	0.908	80.373	89.065	9.673
107.95	101.6	146.304	0.157	0.013	0.888	1.691	2.801	2.826	9.343	-0.137	-0.023	-0.158	-0.058	-0.009	-0.040	63.813	0.902	79.950	89.200	10.083
114.299	101.6	146.304	0.163	0.007	0.882	1.676	2.845	5.823	22.404	0.354	0.226	-0.536	0.148	0.046	-0.065	63.486	0.897	79.553	89.543	10.458
120.65	101.6	146.304	0.165	0.006	0.879	1.583	2.576	1.890	6.358	0.000	0.094	-0.126	0.000	0.063	-0.052	63.292	0.895	79.380	89.618	10.627
127	101.6	146.304	0.165	0.002	0.875	1.731	2.673	2.899	9.271	-0.060	0.087	-0.134	-0.026	0.035	-0.034	63.024	0.891	79.331	89.840	10.670
133.349	101.6	146.304	0.165	0.003	0.870	1.726	2.814	2.642	8.938	-0.312	0.125	0.097	-0.128	0.055	0.026	62.675	0.886	79.293	89.814	10.709
139.699	101.6	146.304	0.161	0.008	0.870	1.539	2.548	2.363	7.220	0.076	0.254	0.055	0.039	0.140	0.018	62.602	0.885	79.537	89.468	10.477
146.05	101.6	146.304	0.158	0.010	0.872	1.556	2.415	2.888	8.298	-0.021	0.243	0.380	-0.011	0.108	0.109	62.694	0.886	79.719	89.345	10.303
152.4	101.6	146.304	0.154	0.012	0.870	1.650	2.488	2.688	8.069	-0.061	0.289	0.160	-0.030	0.130	0.048	62.501	0.883	79.961	89.216	10.070

Station 13: Location 3 raw data file:042613_2 .xls

Vref= 70.8060

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	76.2	146.304	0.168	0.015	0.880	2.054	3.116	1.754	8.503	-0.376	0.383	0.064	-0.117	0.212	0.023	63.461	0.896	79.182	89.017	10.864
6.349	76.2	146.304	0.161	0.018	0.881	1.932	2.894	1.754	7.590	-0.262	0.177	0.110	-0.093	0.105	0.043	63.418	0.896	79.655	88.870	10.408
12.699	76.2	146.304	0.157	0.015	0.881	1.862	2.945	1.754	7.609	0.041	0.123	0.352	0.015	0.044	0.079	63.376	0.895	79.913	89.048	10.133
19.05	76.2	146.304	0.157	0.009	0.885	1.771	3.010	1.754	7.636	-0.017	0.140	0.176	-0.006	0.035	0.026	63.650	0.899	79.928	89.458	10.087
25.399	76.2	146.304	0.164	0.000	0.892	2.236	3.447	1.754	9.979	-0.096	0.164	-0.008	-0.025	0.080	-0.002	64.193	0.907	79.547	89.980	10.453
31.75	76.2	146.304	0.175	-0.003	0.880	3.556	6.039	1.754	26.095	1.684	0.895	0.330	0.156	0.153	0.033	63.497	0.897	78.747	90.213	11.255
38.1	76.2	146.304	0.201	-0.028	0.660	9.303	15.188	1.754	160.152	19.492	9.695	1.646	0.275	0.131	0.014	48.906	0.691	73.067	92.318	17.100
44.45	76.2	146.304	0.100	-0.128	0.287	12.518	21.718	1.754	315.716	20.883	-0.812	-3.343	0.153	-0.007	-0.018	23.345	0.330	72.283	112.789	29.510
50.799	76.2	146.304	0.037	-0.116	0.558	10.056	17.137	1.754	198.946	-0.657	-3.057	-0.616	-0.008	-0.027	-0.003	40.443	0.571	86.313	101.715	12.297
57.149	76.2	146.304	0.029	-0.082	0.806	6.832	12.233	1.754	99.693	0.830	-4.429	-0.836	0.020	-0.087	-0.009	57.387	0.810	87.944	95.788	6.145
63.5	76.2	146.304	0.052	-0.051	0.888	4.112	6.519	1.754	31.239	3.464	-1.054	-0.595	0.258	-0.085	-0.030	63.062	0.891	86.638	93.270	4.693
69.849	76.2	146.304	0.082	-0.032	0.904	2.172	3.649	1.754	10.555	0.463	0.051	-0.098	0.116	0.022	-0.026	64.339	0.909	84.801	92.042	5.588
76.2	76.2	146.304	0.111	-0.015	0.911	2.471	3.664	1.754	11.304	0.672	-1.043	-0.465	0.148	-0.287	-0.086	64.961	0.917	83.034	90.907	7.025
82.549	76.2	146.304	0.129	-0.014	0.907	1.878	3.173	1.754	8.337	0.370	0.181	0.546	0.124	0.050	0.089	64.889	0.916	81.880	90.854	8.166
88.9	76.2	146.304	0.143	-0.006	0.905	1.753	3.073	1.754	7.795	0.154	0.234	0.579	0.057	0.111	0.156	64.901	0.917	81.006	90.392	9.003
95.25	76.2	146.304	0.152	0.001	0.898	1.899	2.764	1.754	7.161	0.117	0.433	0.325	0.045	0.231	0.119	64.488	0.911	80.371	89.936	9.630
101.599	76.2	146.304	0.157	0.003	0.893	1.881	2.831	1.754	7.314	0.049	0.335	0.177	0.018	0.204	0.071	64.175	0.906	80.051	89.802	9.951
107.95	76.2	146.304	0.161	0.007	0.885	1.850	2.763	1.754	7.067	0.049	0.360	0.153	0.019	0.240	0.068	63.713	0.900	79.674	89.579	10.335
114.299	76.2	146.304	0.162	0.008	0.880	1.667	2.712	1.754	6.604	0.203	0.219	0.182	0.089	0.142	0.072	63.320	0.894	79.585	89.487	10.428
120.65	76.2	146.304	0.165	0.008	0.876	1.574	2.686	1.754	6.384	-0.002	-0.007	0.075	-0.001	-0.003	0.018	63.146	0.892	79.313	89.513	10.699
127	76.2	146.304	0.165	0.007	0.874	1.670	2.728	1.754	6.652	-0.003	0.103	0.078	-0.001	0.073	0.034	63.002	0.890	79.316	89.579	10.692
133.349	76.2	146.304	0.161	0.009	0.872	1.703	2.675	1.754	6.565	-0.422	0.241	0.112	-0.185	0.090	0.026	62.788	0.887	79.523	89.396	10.494
139.699	76.2	146.304	0.153	0.016	0.870	1.570	2.694	1.754	6.400	-0.155	0.139	0.161	-0.073	0.102	0.069	62.566	0.884	80.005	88.983	10.047
146.05	76.2	146.304	0.147	0.025	0.875	1.519	2.629	1.754	6.147	-0.114	0.131	0.432	-0.057	0.056	0.107	62.840	0.887	80.436	88.389	9.701
152.4	76.2	146.304	0.141	0.029	0.878	1.727	2.744	1.754	6.792	-0.117	0.207	0.258	-0.049	0.151	0.118	62.998	0.890	80.855	88.143	9.335

Station 13: Location 4 raw data file: 042613_3 .xls

Vref= 70.8060

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	50.799	146.31	0.160	0.039	0.861	2.607	4.133	3.989	19.897	-0.158	0.560	0.720	-0.029	0.107	0.087	62.083	0.877	79.467	87.443	10.846
6.349	50.799	146.31	0.188	-0.013	0.872	9.363	16.295	3.729	183.549	-72.439	-1.326	2.950	-0.947	-0.076	0.097	63.136	0.892	77.842	90.858	12.189
12.699	50.799	146.31	0.224	-0.089	0.872	12.847	22.346	4.595	342.743	-139.489	-0.564	-0.428	-0.969	-0.019	-0.008	64.058	0.905	75.679	95.619	15.428
19.05	50.799	146.31	0.135	0.051	0.877	2.402	3.666	4.528	19.853	-0.527	0.148	0.236	-0.119	0.027	0.028	62.908	0.888	81.260	86.707	9.349
25.399	50.799	146.31	0.121	0.045	0.876	2.285	3.730	3.572	15.947	0.230	0.031	0.071	0.054	0.008	0.011	62.698	0.885	82.166	87.059	8.375
31.75	50.799	146.31	0.105	0.035	0.864	3.178	5.029	4.996	30.176	0.374	0.486	0.492	0.047	0.061	0.039	61.698	0.871	83.050	87.667	7.335
38.1	50.799	146.31	0.142	-0.026	0.581	8.875	15.751	12.923	246.937	25.011	6.331	8.416	0.357	0.110	0.082	42.426	0.599	76.267	92.527	13.973
44.45	50.799	146.31	0.057	-0.148	0.388	12.375	18.528	24.843	556.799	-1.859	-26.339	-2.602	-0.016	-0.171	-0.011	29.677	0.419	82.202	110.721	22.268
50.799	50.799	146.31	0.037	-0.081	0.691	8.146	14.008	17.297	280.886	-3.077	0.952	-5.472	-0.054	0.013	-0.045	49.318	0.697	86.977	96.692	7.349
57.149	50.799	146.31	0.062	-0.091	0.814	7.222	12.083	14.873	209.682	-20.370	9.957	5.498	-0.466	0.185	0.061	58.160	0.821	85.681	96.329	7.673
63.5	50.799	146.31	0.080	-0.041	0.884	2.353	3.812	3.017	14.588	0.077	0.606	0.489	0.017	0.170	0.085	62.906	0.888	84.856	92.636	5.784
69.849	50.799	146.31	0.098	-0.035	0.880	2.117	3.478	2.683	11.888	-0.189	0.480	0.368	-0.051	0.168	0.079	62.746	0.886	83.650	92.273	6.747
76.2	50.799	146.31	0.111	-0.033	0.874	2.065	3.350	2.613	11.157	0.066	0.468	0.463	0.019	0.173	0.106	62.420	0.882	82.753	92.164	7.566
82.549	50.799	146.31	0.123	-0.025	0.874	2.118	3.351	3.111	12.698	0.428	0.463	0.494	0.120	0.140	0.094	62.544	0.883	81.987	91.602	8.174
88.9	50.799	146.31	0.136	-0.015	0.870	2.042	3.469	2.448	11.100	-0.139	0.508	0.681	-0.039	0.203	0.160	62.377	0.881	81.122	90.973	8.932
95.25	50.799	146.31	0.145	-0.001	0.868	1.977	3.322	3.746	14.487	0.045	0.413	0.470	0.014	0.111	0.075	62.306	0.880	80.503	90.059	9.497
101.599	50.799	146.31	0.155	0.007	0.870	1.990	3.379	3.655	14.369	-0.125	0.540	0.701	-0.037	0.148	0.113	62.563	0.884	79.867	89.544	10.143
107.95	50.799	146.31	0.150	0.021	0.884	1.976	2.940	2.127	8.538	0.360	0.472	0.341	0.123	0.224	0.109	63.522	0.897	80.368	88.646	9.728
114.299	50.799	146.31	0.150	0.018	0.875	1.998	3.279	3.753	14.411	0.031	0.595	0.217	0.009	0.158	0.035	62.898	0.888	80.261	88.827	9.811
120.65	50.799	146.31	0.147	0.017	0.868	1.990	3.015	2.220	8.989	0.335	0.481	0.522	0.111	0.217	0.155	62.363	0.881	80.377	88.883	9.689
127	50.799	146.31	0.150	0.020	0.864	1.935	3.097	2.054	8.775	-0.120	0.318	0.339	-0.040	0.160	0.106	62.128	0.877	80.151	88.671	9.940
133.349	50.799	146.31	0.150	0.025	0.864	1.881	2.834	2.257	8.333	-0.209	0.250	0.468	-0.078	0.118	0.146	62.109	0.877	80.149	88.388	9.985
139.699	50.799	146.31	0.149	0.031	0.865	1.740	2.841	2.668	9.108	0.051	0.292	0.510	0.021	0.125	0.134	62.185	0.878	80.263	87.982	9.948
146.05	50.799	146.31	0.148	0.036	0.872	1.700	2.661	2.442	7.968	-0.112	0.296	0.393	-0.049	0.142	0.121	62.693	0.885	80.363	87.665	9.921
152.4	50.799	146.31	0.150	0.042	0.873	1.744	2.603	1.721	6.389	0.000	0.253	0.290	0.000	0.168	0.129	62.775	0.887	80.278	87.283	10.102

Station 13: Location 5 raw data file: 42613353.xls

Vref= 70.8060

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	37.306	146.31	0.163	0.009	0.846	8.078	13.919	4.674	140.415	-41.892	-2.149	10.027	-0.743	-0.114	0.307	61.042	0.862	79.086	89.420	10.930
6.349	37.306	146.31	0.133	0.055	0.840	2.676	3.787	3.145	15.697	0.083	0.674	0.872	0.016	0.160	0.146	60.373	0.853	81.020	86.333	9.712
12.699	37.306	146.31	0.134	0.062	0.847	2.793	3.934	3.432	17.529	0.391	0.601	0.826	0.071	0.125	0.122	60.885	0.860	81.029	85.834	9.905
19.05	37.306	146.31	0.135	0.066	0.858	2.553	3.996	2.734	14.980	0.733	0.662	0.458	0.143	0.189	0.084	61.689	0.871	81.090	85.665	9.924
25.399	37.306	146.31	0.131	0.066	0.864	2.654	4.177	3.735	19.223	0.426	0.414	0.502	0.077	0.083	0.064	62.064	0.877	81.373	85.681	9.662
31.75	37.306	146.31	0.140	0.072	0.858	3.702	5.942	4.195	33.306	2.080	0.729	1.142	0.189	0.094	0.091	61.732	0.872	80.771	85.267	10.391
38.1	37.306	146.31	0.158	-0.006	0.575	11.216	18.384	16.657	370.619	40.292	12.580	17.038	0.390	0.134	0.111	42.224	0.596	74.669	90.571	15.343
44.45	37.306	146.31	0.028	-0.175	0.320	10.912	18.409	16.838	370.730	2.602	-1.148	19.003	0.026	-0.012	0.122	25.898	0.366	85.609	118.584	28.982
50.799	37.306	146.31	0.020	-0.087	0.674	7.155	12.061	14.875	208.975	-3.918	-3.285	-3.549	-0.091	-0.062	-0.039	48.138	0.680	88.302	97.329	7.525
57.149	37.306	146.31	0.058	-0.069	0.805	4.082	7.574	8.997	77.489	0.473	0.947	1.041	0.031	0.051	0.030	57.371	0.810	85.873	94.879	6.397
63.5	37.306	146.31	0.083	-0.054	0.841	2.791	4.344	4.090	21.694	-0.524	1.581	0.712	-0.086	0.276	0.080	59.977	0.847	84.399	93.631	6.681
69.849	37.306	146.31	0.102	-0.042	0.846	2.419	3.768	3.522	16.226	0.131	0.936	0.434	0.029	0.219	0.065	60.399	0.853	83.153	92.838	7.417
76.2	37.306	146.31	0.113	-0.033	0.839	2.354	3.804	3.417	15.844	-0.108	0.462	0.332	-0.024	0.115	0.051	59.978	0.847	82.328	92.228	7.993
82.549	37.306	146.31	0.122	-0.026	0.840	2.340	4.132	3.169	16.295	-0.089	0.415	0.725	-0.018	0.112	0.110	60.113	0.849	81.761	91.780	8.431
88.9	37.306	146.31	0.131	-0.018	0.839	2.240	3.818	3.231	15.019	-0.027	0.336	0.815	-0.006	0.093	0.132	60.116	0.849	81.092	91.248	8.996
95.25	37.306	146.31	0.119	0.002	0.853	2.380	3.879	3.671	17.093	0.547	0.863	1.382	0.118	0.197	0.194	60.991	0.861	82.029	89.881	7.972
101.599	37.306	146.31	0.126	0.013	0.858	2.606	3.842	3.159	15.764	0.415	1.058	1.072	0.083	0.256	0.176	61.404	0.867	81.677	89.155	8.367
107.95	37.306	146.31	0.132	0.016	0.857	2.531	3.982	3.015	15.674	0.605	1.218	1.079	0.120	0.318	0.179	61.407	0.867	81.275	88.958	8.788
114.299	37.306	146.31	0.135	0.019	0.854	2.559	4.094	2.917	15.912	0.487	1.030	1.153	0.093	0.275	0.192	61.262	0.865	81.046	88.751	9.042
120.65	37.306	146.31	0.138	0.018	0.853	2.668	4.154	3.015	16.730	0.566	0.867	0.765	0.102	0.215	0.122	61.185	0.864	80.821	88.794	9.260
127	37.306	146.31	0.136	0.021	0.839	2.580	4.041	3.027	16.073	0.288	0.866	1.510	0.055	0.221	0.246	60.188	0.850	80.806	88.615	9.299
133.349	37.306	146.31	0.133	0.024	0.839	2.493	4.018	2.972	15.595	0.092	0.815	1.420	0.018	0.219	0.237	60.189	0.850	81.026	88.411	9.116
139.699	37.306	146.31	0.134	0.029	0.839	2.425	3.694	3.135	14.677	-0.246	0.769	1.098	-0.055	0.202	0.189	60.207	0.850	80.964	88.028	9.253
146.05	37.306	146.31	0.133	0.036	0.849	2.208	3.786	3.289	15.011	0.026	0.553	1.077	0.006	0.152	0.172	60.936	0.861	81.098	87.590	9.227
152.4	37.306	146.31	0.133	0.042	0.850	2.324	3.679	3.048	14.109	0.109	0.531	0.498	0.025	0.150	0.089	60.985	0.861	81.135	87.221	9.297

Station 13: Location 6 raw data file: 42613403 .xls

Vref= 70.8060

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	24.606	146.31	0.082	0.040	0.781	4.524	7.389	7.204	63.479	2.984	4.877	12.152	0.178	0.298	0.455	55.709	0.787	83.992	87.095	6.678
6.349	24.606	146.31	0.084	0.047	0.794	3.435	4.992	4.546	28.692	0.010	1.104	0.962	0.001	0.141	0.085	56.641	0.800	83.956	86.638	6.922
12.699	24.606	146.31	0.086	0.053	0.802	3.032	4.752	4.137	24.448	0.628	0.842	1.023	0.087	0.134	0.104	57.269	0.809	83.893	86.253	7.172
19.05	24.606	146.31	0.093	0.065	0.826	4.264	4.787	4.779	31.970	2.177	4.407	2.734	0.213	0.431	0.238	59.051	0.834	83.593	85.537	7.819
25.399	24.606	146.31	0.096	0.070	0.832	2.718	4.360	3.966	21.064	0.892	0.250	0.491	0.150	0.046	0.057	59.504	0.840	83.433	85.238	8.124
31.75	24.606	146.31	0.108	0.075	0.837	3.096	5.174	4.075	26.481	1.467	-0.307	-0.199	0.183	-0.049	-0.019	59.968	0.847	82.660	84.919	8.943
38.1	24.606	146.31	0.137	-0.002	0.564	9.607	17.823	14.519	310.381	39.594	7.415	10.960	0.461	0.106	0.084	41.100	0.580	76.363	90.226	13.639
44.45	24.606	146.31	0.025	-0.175	0.377	9.293	15.507	14.604	270.051	0.706	0.034	1.297	0.010	0.000	0.011	29.477	0.416	86.608	114.820	25.082
50.799	24.606	146.31	0.021	-0.094	0.628	6.114	10.593	12.207	149.306	0.825	-0.507	-1.105	0.025	-0.014	-0.017	44.994	0.635	88.096	98.548	8.760
57.149	24.606	146.31	0.049	-0.079	0.731	3.642	6.240	6.819	49.355	1.653	0.111	0.911	0.145	0.009	0.043	52.146	0.736	86.192	96.130	7.225
63.5	24.606	146.31	0.073	-0.051	0.771	3.230	5.438	5.705	36.279	0.818	1.278	1.842	0.093	0.138	0.118	54.923	0.776	84.633	93.772	6.566
69.849	24.606	146.31	0.084	-0.030	0.789	2.767	4.656	4.936	26.850	0.289	0.503	0.547	0.045	0.073	0.047	56.250	0.794	83.911	92.160	6.464
76.2	24.606	146.31	0.095	-0.022	0.793	2.956	5.040	5.105	30.103	0.727	0.886	1.073	0.097	0.117	0.083	56.594	0.799	83.171	91.577	7.011
82.549	24.606	146.31	0.088	-0.017	0.785	3.025	5.053	5.712	33.659	0.758	0.950	1.263	0.099	0.110	0.087	55.960	0.790	83.595	91.232	6.524
88.9	24.606	146.31	0.093	-0.014	0.791	3.222	5.388	5.024	32.327	0.305	0.844	0.295	0.035	0.104	0.022	56.435	0.797	83.299	90.978	6.773
95.25	24.606	146.31	0.096	0.002	0.813	2.867	4.470	4.358	23.596	0.599	1.320	1.040	0.093	0.211	0.106	57.961	0.819	83.242	89.890	6.759
101.599	24.606	146.31	0.102	0.012	0.824	2.891	4.538	4.179	23.209	1.408	0.900	1.323	0.214	0.149	0.139	58.762	0.830	82.938	89.193	7.108
107.95	24.606	146.31	0.101	0.013	0.827	2.959	4.480	3.777	21.547	1.778	0.695	0.862	0.268	0.124	0.102	59.014	0.833	83.013	89.129	7.041
114.299	24.606	146.31	0.110	0.017	0.828	2.889	4.473	3.499	20.297	1.154	1.145	1.447	0.178	0.226	0.184	59.183	0.836	82.463	88.857	7.624
120.65	24.606	146.31	0.111	0.016	0.821	2.835	4.408	3.771	20.839	1.088	1.460	1.621	0.174	0.272	0.195	58.651	0.828	82.292	88.863	7.792
127	24.606	146.31	0.112	0.020	0.805	2.918	4.467	4.579	24.715	1.065	0.985	0.869	0.163	0.147	0.085	57.572	0.813	82.099	88.570	8.031
133.349	24.606	146.31	0.113	0.022	0.802	3.051	4.721	3.962	23.648	0.821	1.427	1.124	0.114	0.235	0.120	57.356	0.810	81.980	88.465	8.167
139.699	24.606	146.31	0.109	0.029	0.805	2.929	4.730	3.853	22.897	0.565	1.305	1.121	0.081	0.231	0.123	57.560	0.813	82.271	87.924	8.006
146.05	24.606	146.31	0.107	0.037	0.803	3.059	4.907	3.944	24.498	0.217	0.947	1.470	0.029	0.156	0.151	57.409	0.811	82.447	87.380	8.000
152.4	24.606	146.31	0.105	0.045	0.814	2.983	4.873	3.826	23.645	0.468	0.840	1.166	0.064	0.147	0.125	58.204	0.822	82.632	86.864	8.015

Station 13: Location 7 raw data file: 42613453.xls

Vref= 70.8734

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	11.906	146.304	0.002	0.047	0.725	5.042	6.589	5.573	49.950	-0.311	1.560	1.863	-0.019	0.111	0.101	51.478	0.726	89.857	86.277	3.726
6.349	11.906	146.304	0.005	0.050	0.747	4.575	6.059	4.643	39.593	1.076	1.104	1.190	0.077	0.104	0.084	53.030	0.748	89.597	86.205	3.816
12.699	11.906	146.304	0.008	0.051	0.759	3.343	5.550	3.756	28.044	0.386	1.324	1.255	0.041	0.210	0.120	53.880	0.760	89.383	86.186	3.864
19.05	11.906	146.304	0.023	0.054	0.769	3.368	5.283	3.546	25.915	0.181	0.828	0.220	0.020	0.138	0.023	54.646	0.771	88.324	85.953	4.382
25.399	11.906	146.304	0.043	0.056	0.780	3.677	5.238	3.694	27.303	-0.398	1.090	0.091	-0.041	0.160	0.009	55.518	0.783	86.870	85.885	5.173
31.75	11.906	146.304	0.069	0.048	0.783	5.315	6.458	8.327	69.644	0.279	2.153	3.654	0.016	0.097	0.135	55.797	0.787	84.952	86.473	6.164
38.1	11.906	146.304	0.121	-0.014	0.484	9.191	16.754	14.646	289.842	26.296	6.017	5.640	0.340	0.089	0.046	35.386	0.499	76.022	91.622	14.076
44.45	11.906	146.304	0.021	-0.098	0.409	8.023	11.529	11.600	165.927	-1.681	0.171	4.222	-0.036	0.004	0.063	29.858	0.421	87.113	103.499	13.816
50.799	11.906	146.304	-0.003	-0.068	0.523	-4.596	8.214	10.347	97.825	3.240	-1.327	-2.949	0.171	-0.056	-0.069	37.400	0.528	90.328	97.427	7.434
57.149	11.906	146.304	0.007	-0.052	0.569	5.446	8.205	10.085	99.353	2.135	-5.127	-2.010	0.095	-0.186	-0.048	40.482	0.571	89.289	95.208	5.256
63.5	11.906	146.304	0.005	-0.019	0.658	4.497	7.684	8.393	74.855	2.062	0.309	0.053	0.119	0.016	0.002	46.686	0.659	89.591	91.664	1.714
69.849	11.906	146.304	-0.004	-0.024	0.666	-4.713	7.947	8.639	80.003	1.367	1.726	1.792	0.073	0.084	0.052	47.242	0.667	90.384	92.065	2.101
76.2	11.906	146.304	-0.002	-0.018	0.677	-4.709	7.766	7.863	72.152	2.288	2.978	4.662	0.125	0.160	0.152	48.019	0.678	90.148	91.534	1.542
82.549	11.906	146.304	0.003	-0.004	0.698	4.582	7.847	7.508	69.467	1.980	1.646	1.846	0.110	0.095	0.062	49.436	0.698	89.745	90.348	0.432
88.9	11.906	146.304	0.001	0.002	0.718	4.574	7.790	6.961	65.027	1.985	1.505	1.356	0.111	0.094	0.050	50.901	0.718	89.905	89.832	0.193
95.25	11.906	146.304	0.011	0.004	0.738	4.575	7.587	7.396	66.590	2.855	1.703	1.233	0.164	0.100	0.044	52.324	0.738	89.173	89.704	0.878
101.599	11.906	146.304	0.019	0.006	0.747	4.503	7.817	7.252	66.983	2.705	2.118	3.118	0.153	0.129	0.109	52.988	0.748	88.539	89.550	1.529
107.95	11.906	146.304	0.035	0.011	0.742	4.539	7.776	7.710	70.248	3.254	1.569	1.065	0.184	0.089	0.035	52.620	0.742	87.302	89.167	2.824
114.299	11.906	146.304	0.040	0.014	0.738	4.904	7.963	8.275	77.969	3.296	3.424	4.194	0.168	0.168	0.127	52.404	0.739	86.883	88.938	3.294
120.65	11.906	146.304	0.045	0.024	0.722	5.037	8.378	8.121	80.755	1.580	3.915	3.822	0.075	0.191	0.112	51.329	0.724	86.416	88.130	4.044
127	11.906	146.304	0.041	0.028	0.714	5.360	8.445	7.456	77.818	0.316	3.551	1.464	0.014	0.177	0.046	50.739	0.716	86.683	87.783	3.992
133.349	11.906	146.304	0.032	0.038	0.719	5.059	8.414	6.492	69.262	1.270	1.695	3.533	0.059	0.103	0.129	51.095	0.721	87.452	86.968	3.962
139.699	11.906	146.304	0.020	0.040	0.727	5.100	8.203	5.901	64.064	0.896	2.779	3.255	0.043	0.184	0.134	51.633	0.729	88.424	86.847	3.526
146.05	11.906	146.304	0.011	0.051	0.741	4.573	7.314	5.123	50.326	0.826	1.974	1.432	0.049	0.168	0.076	52.674	0.743	89.129	86.098	3.998
152.4	11.906	146.304	0.012	0.050	0.755	4.199	6.801	4.389	41.573	0.316	1.772	1.848	0.022	0.191	0.123	53.599	0.756	89.093	86.204	3.903

Station 13: Location 8 raw data file: 42613478.xls

Vref= 70.9071

Flowfield Coord.			Non-Dim. Velocity			Turblulence Intensities				Reynolds Stress			Correlation Coefficients			Total Velocity		Flow Angles		
X'	Y'	Z'	U/Vref	V/Vref	W/Vref	Tu	Tv	Tw	k/(Vref)^2	UV	UW	VW	UV	UW	VW	Utot	Utot/Vref	alpha	beta	gamma
0	5.549	146.304	-0.075	0.038	0.714	4.058	6.677	5.750	47.055	2.910	1.086	1.004	0.214	0.093	0.052	50.963	0.719	95.953	86.971	6.684
6.349	5.549	146.304	-0.060	0.033	0.731	3.879	6.200	5.067	39.581	2.402	1.470	1.397	0.199	0.149	0.088	52.058	0.734	94.716	87.415	5.380
12.699	5.549	146.304	-0.043	0.030	0.737	3.843	5.838	4.914	36.495	1.050	1.336	0.104	0.093	0.141	0.007	52.408	0.739	93.330	87.699	4.049
19.05	5.549	146.304	-0.025	0.037	0.751	3.699	5.463	4.748	33.034	0.222	0.645	-0.489	0.022	0.073	-0.037	53.359	0.753	91.905	87.196	3.391
25.399	5.549	146.304	-0.007	0.038	0.759	3.725	5.402	4.677	32.469	-0.784	1.059	0.348	-0.078	0.121	0.027	53.868	0.760	90.516	87.097	2.948
31.75	5.549	146.304	0.019	0.061	0.768	3.823	7.022	5.742	48.448	2.457	0.810	-0.200	0.182	0.073	-0.010	54.647	0.771	88.594	85.489	4.726
38.1	5.549	146.304	0.058	-0.060	0.333	10.067	18.273	11.773	286.928	4.226	0.335	2.971	0.046	0.006	0.027	24.311	0.343	80.308	99.995	13.993
44.45	5.549	146.304	-0.078	-0.063	0.343	10.775	13.035	10.520	198.333	16.123	16.028	10.334	0.228	0.281	0.150	25.306	0.357	102.620	100.092	16.265
50.799	5.549	146.304	-0.119	-0.053	0.420	5.413	9.576	9.642	106.977	3.026	-1.098	-0.903	0.116	-0.042	-0.019	31.184	0.440	105.657	96.969	17.212
57.149	5.549	146.304	-0.122	-0.021	0.481	5.599	9.296	10.548	114.522	3.747	0.034	-1.601	0.143	0.001	-0.032	35.231	0.497	104.213	92.446	14.431
63.5	5.549	146.304	-0.128	-0.009	0.522	5.445	9.002	10.103	106.384	3.415	0.870	0.498	0.139	0.031	0.011	38.124	0.538	103.744	90.948	13.778
69.849	5.549	146.304	-0.120	-0.001	0.542	5.418	9.564	10.332	113.783	3.584	-0.944	-1.176	0.138	-0.034	-0.024	39.341	0.555	102.486	90.056	12.486
76.2	5.549	146.304	-0.119	0.003	0.576	5.465	9.337	10.080	109.321	3.824	0.025	3.202	0.149	0.001	0.068	41.716	0.588	101.697	89.738	11.700
82.549	5.549	146.304	-0.116	0.007	0.597	5.639	10.104	10.269	119.671	4.180	2.191	1.011	0.146	0.075	0.019	43.131	0.608	100.948	89.304	10.970
88.9	5.549	146.304	-0.110	0.021	0.605	5.900	10.075	10.526	123.554	3.258	1.122	2.900	0.109	0.036	0.054	43.597	0.615	100.327	88.035	10.516
95.25	5.549	146.304	-0.095	0.015	0.605	6.309	9.873	10.542	124.201	2.367	-0.165	-0.847	0.076	-0.005	-0.016	43.447	0.613	98.957	88.574	9.071
101.599	5.549	146.304	-0.090	0.017	0.603	6.647	10.773	10.415	134.354	3.983	2.679	1.520	0.111	0.077	0.027	43.229	0.610	98.493	88.419	8.641
107.95	5.549	146.304	-0.092	0.023	0.607	6.457	10.880	9.875	128.790	7.254	2.725	-1.238	0.205	0.085	-0.023	43.546	0.614	98.617	87.832	8.890
114.299	5.549	146.304	-0.092	0.024	0.605	6.729	11.266	10.190	138.016	9.081	0.194	0.105	0.238	0.006	0.002	43.408	0.612	98.647	87.763	8.936
120.65	5.549	146.304	-0.088	0.031	0.609	6.699	10.984	9.525	128.126	5.900	0.229	1.489	0.159	0.007	0.028	43.706	0.616	98.231	87.099	8.734
127	5.549	146.304	-0.088	0.034	0.628	6.398	10.504	8.869	114.970	4.825	-2.790	1.939	0.143	-0.098	0.041	45.027	0.635	97.973	86.935	8.548
133.349	5.549	146.304	-0.091	0.039	0.653	6.027	9.741	7.615	94.602	4.383	1.214	0.346	0.149	0.053	0.009	46.863	0.661	97.897	86.623	8.597
139.699	5.549	146.304	-0.090	0.048	0.674	5.373	8.969	6.704	77.133	5.093	1.832	1.882	0.210	0.101	0.062	48.362	0.682	97.546	85.958	8.571
146.05	5.549	146.304	-0.077	0.043	0.697	4.970	8.253	5.987	64.323	3.747	0.569	0.524	0.182	0.038	0.021	49.844	0.703	96.295	86.531	7.195
152.4	5.549	146.304	-0.060	0.039	0.711	4.641	7.455	5.899	55.954	3.435	1.161	2.857	0.197	0.084	0.129	50.683	0.715	94.841	86.839	5.785

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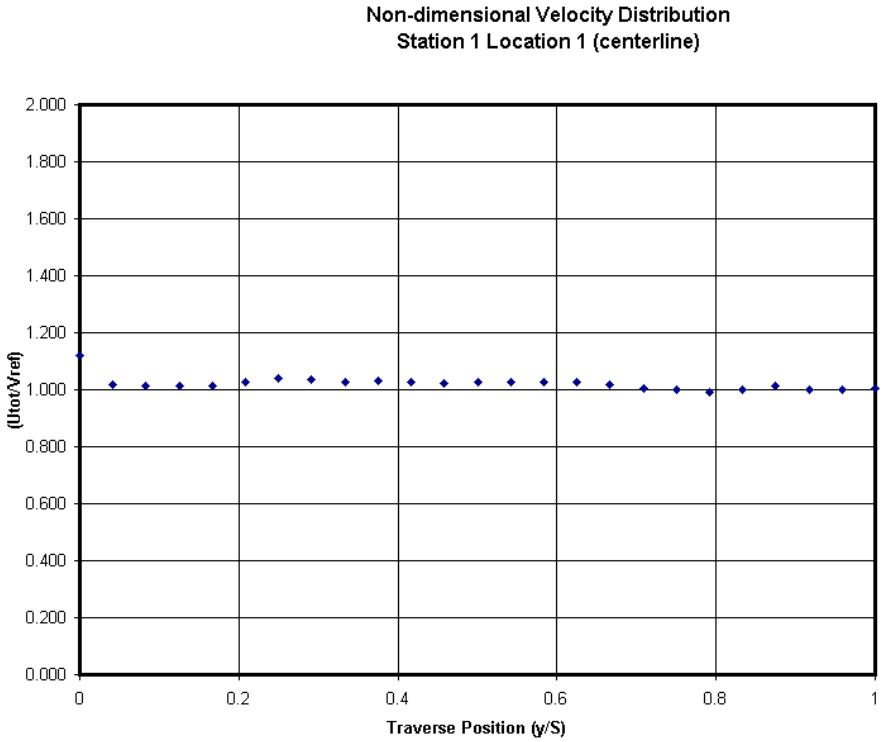
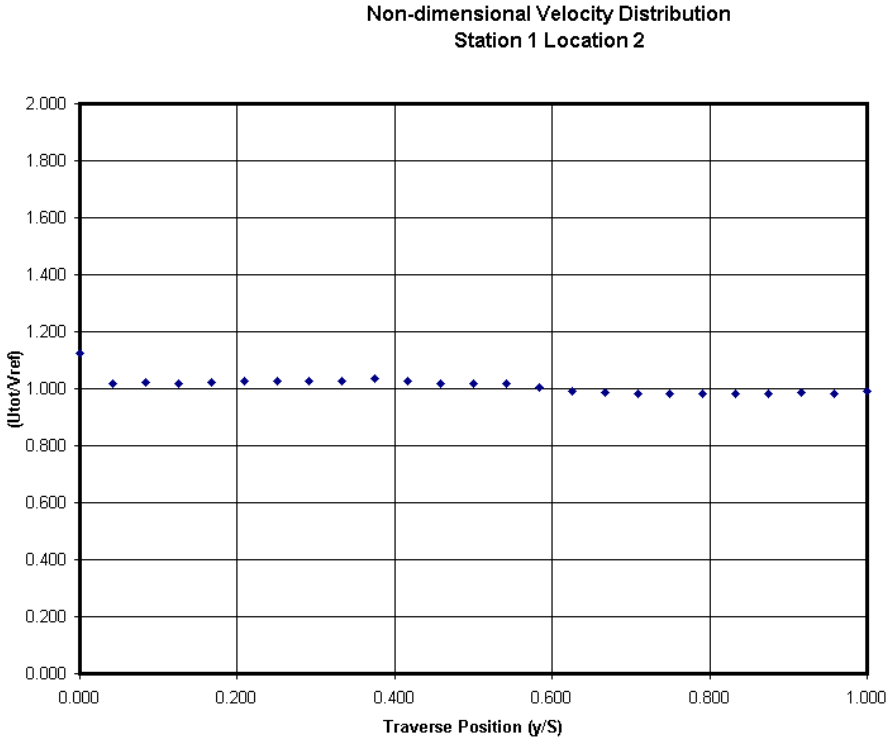
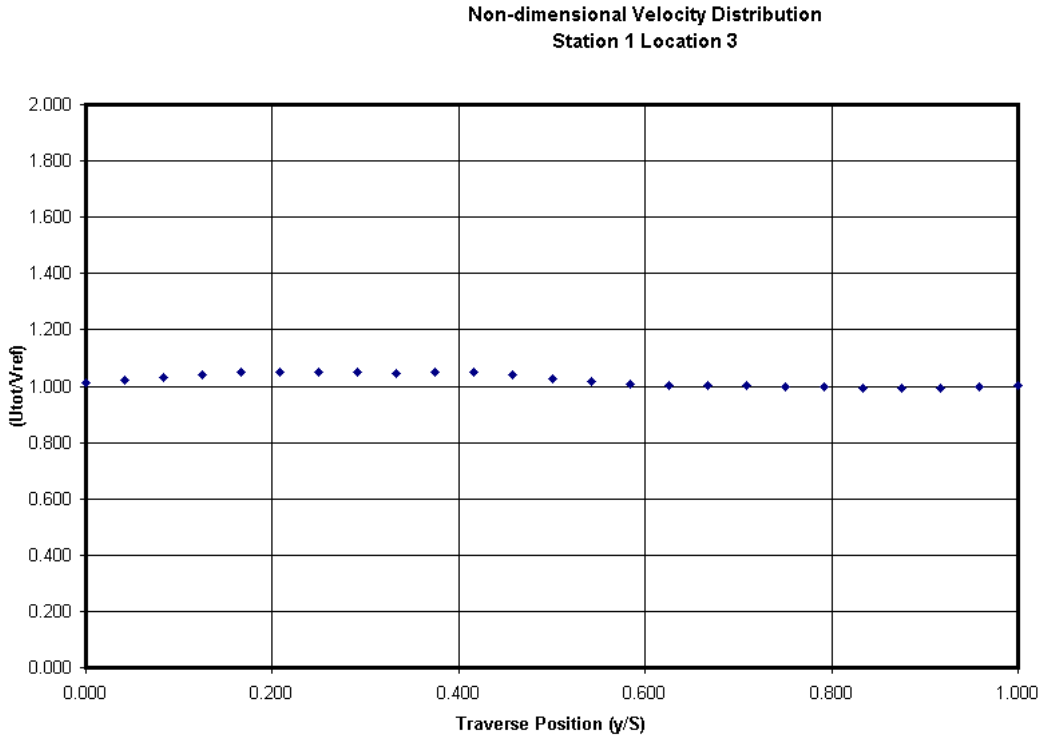
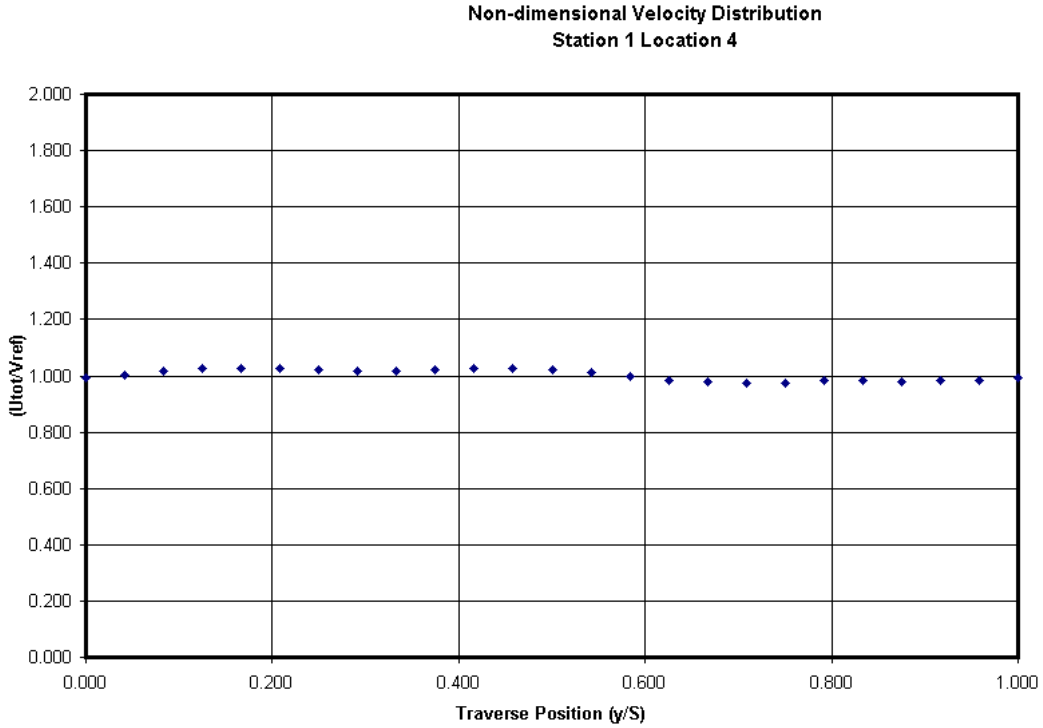
APPENDIX C: NON-DIMENSIONAL VELOCITY PROFILES






Non-dimensional Velocity Distribution
Station 1 Location 3
(Utot/Vref)
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0.000
0.200
0.400
0.600
0.800
1.000
Traverse Position (y/S)


Non-dimensional Velocity Distribution
Station 1 Location 4
(Utot/Vref)
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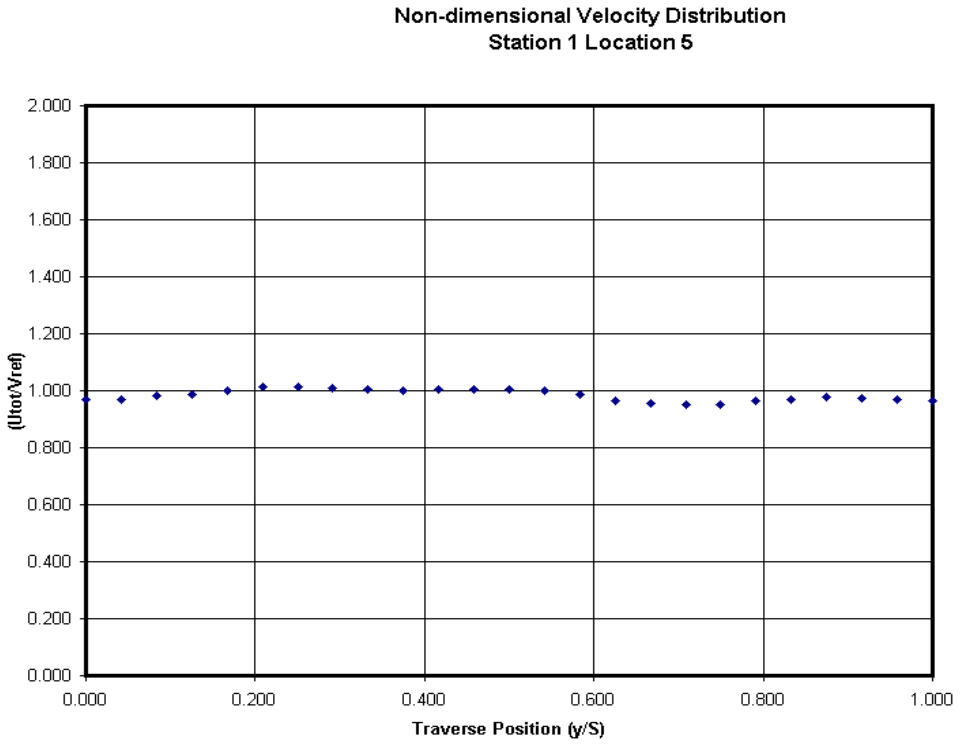
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0.000
0.200
0.400
0.600
0.800
1.000
Traverse Position (y/S)


Non-dimensional Velocity Distribution
Station 1 Location 5
(Utot/Vref)
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1.200
1.000
0.800
0.600
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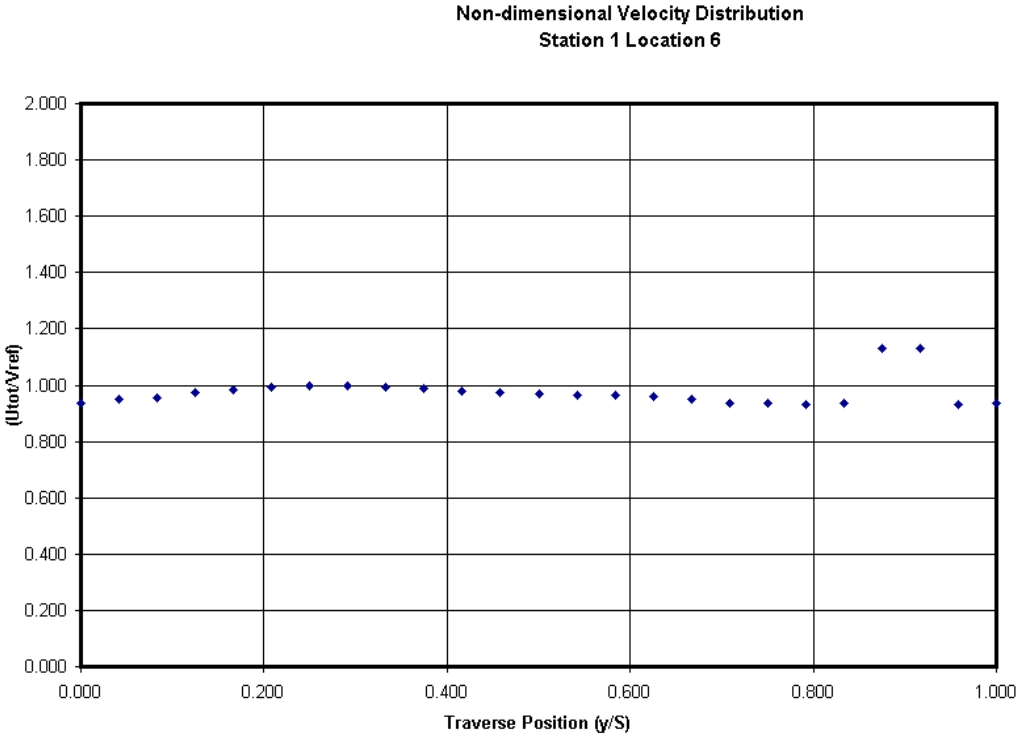
0.200
0.000
0.000
0.200
0.400
0.600
0.800
1.000
Traverse Position (y/S)


Non-dimensional Velocity Distribution
Station 1 Location 6
(Utot/Vref)
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1.800
1.600
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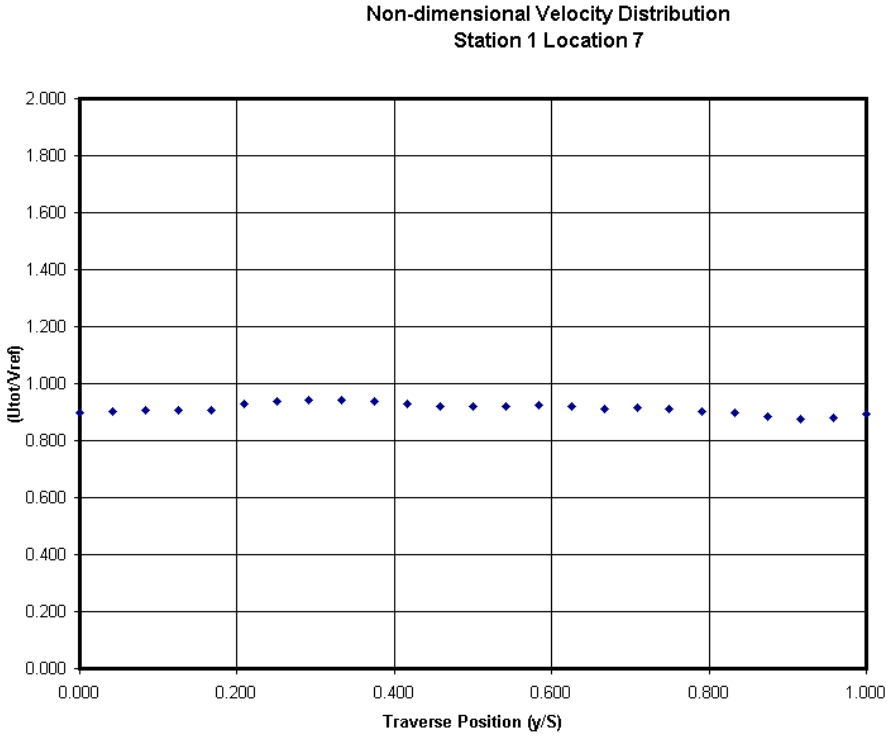
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0.000
0.200
0.400
0.600
0.800
1.000
Traverse Position (y/S)


Non-dimensional Velocity Distribution
Station 1 Location 7
(Utot/Vref)
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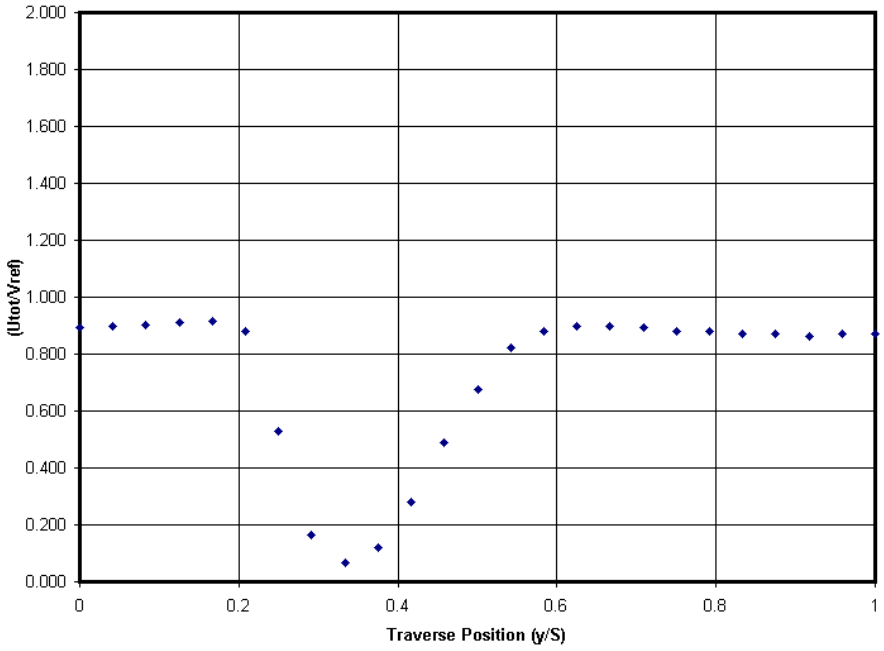
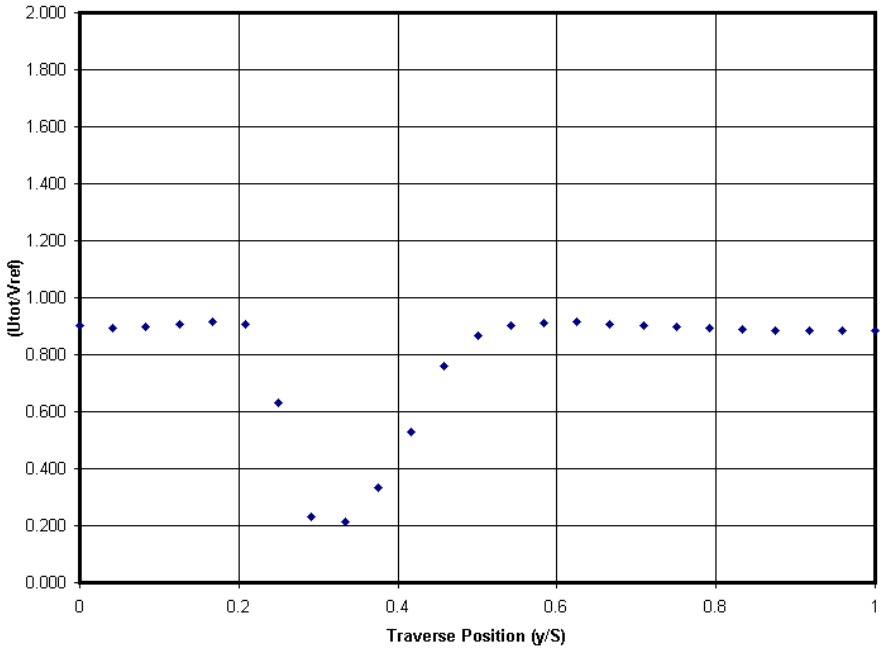
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0.000
0.200
0.400
0.600
0.800
1.000
Traverse Position (y/S)

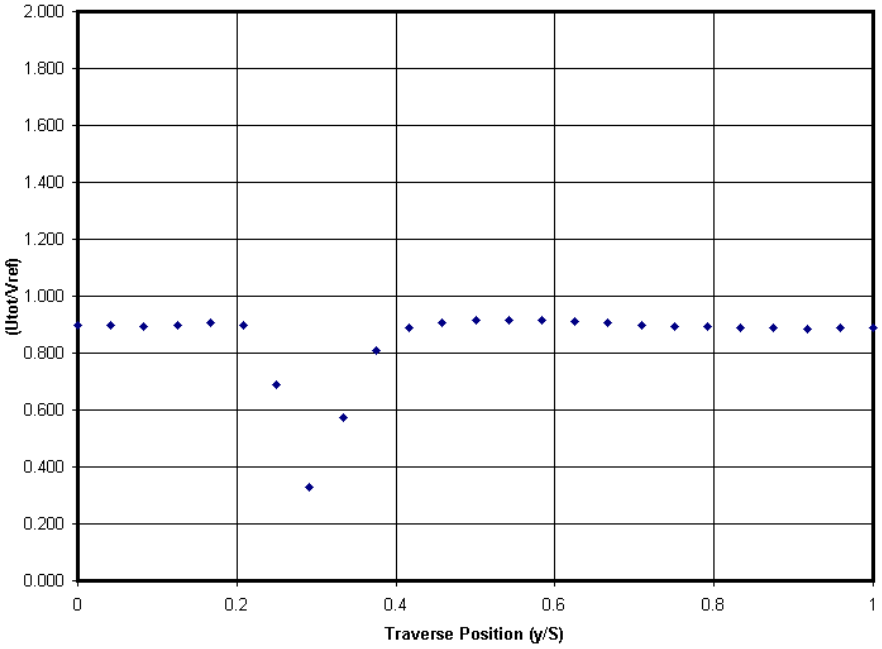
Non-dimensional Velocity Distribution
Station 13 Location 1 (centerline)



Non-dimensional Velocity Distribution
Station 13 Location 2



Non-dimensional Velocity Distribution
Station 13 Location 3



Non-dimensional Velocity Distribution
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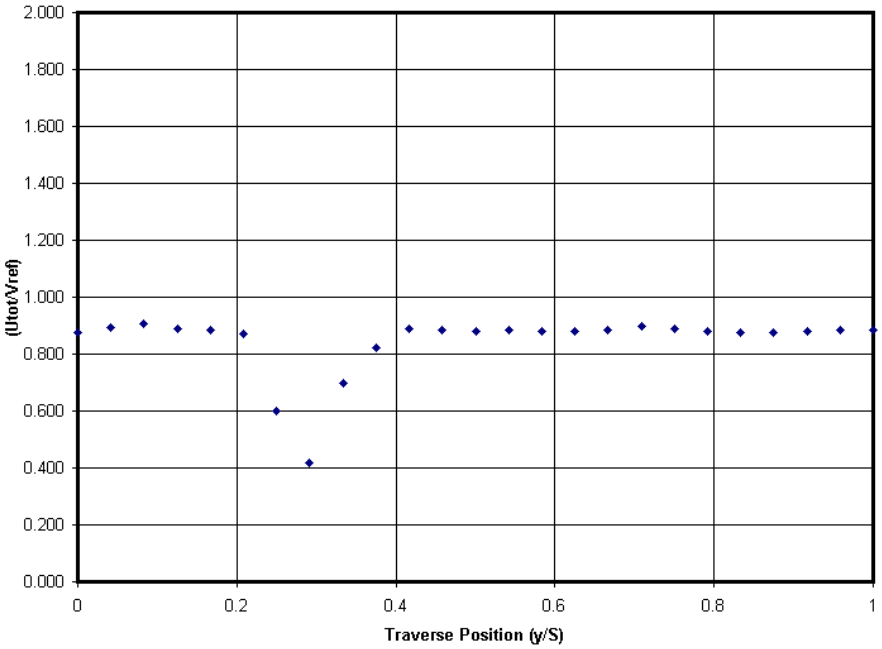
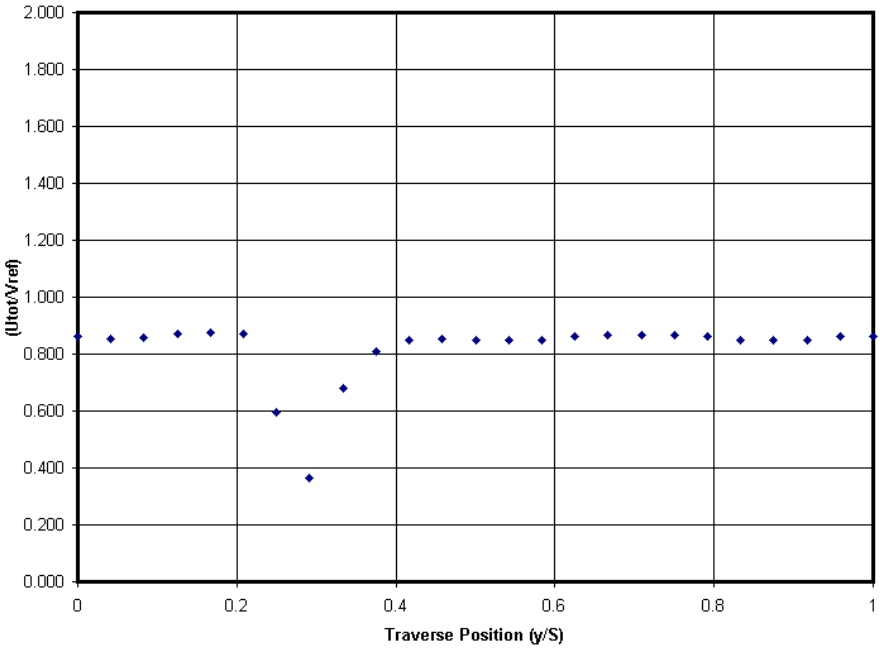
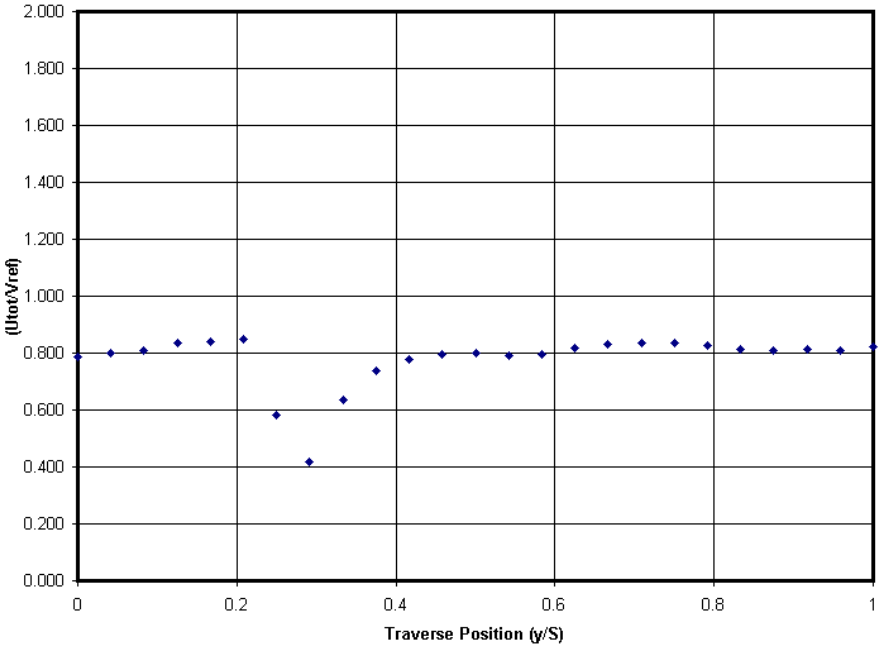


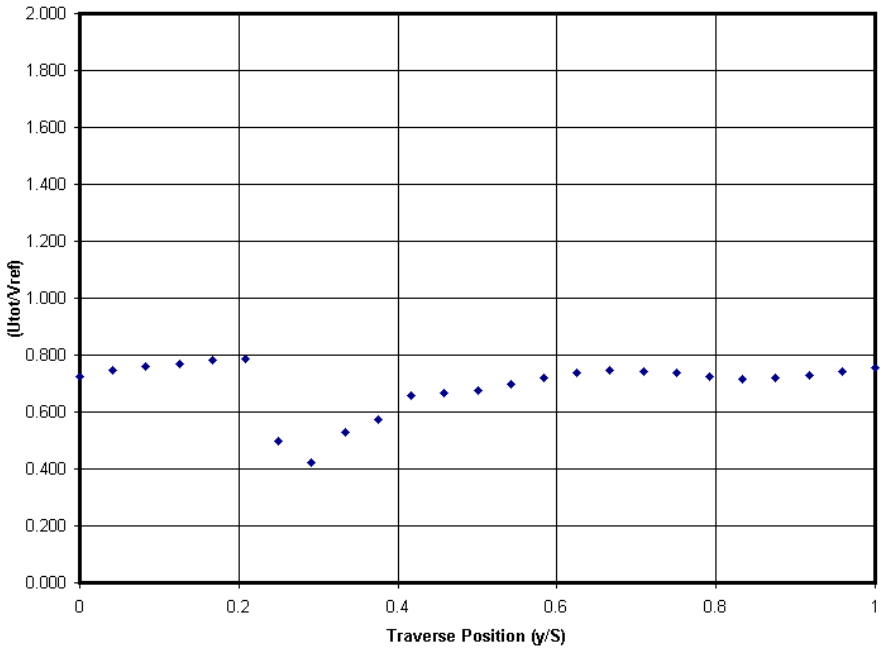
Non-dimensional Velocity Distribution
Station 13 Location 5



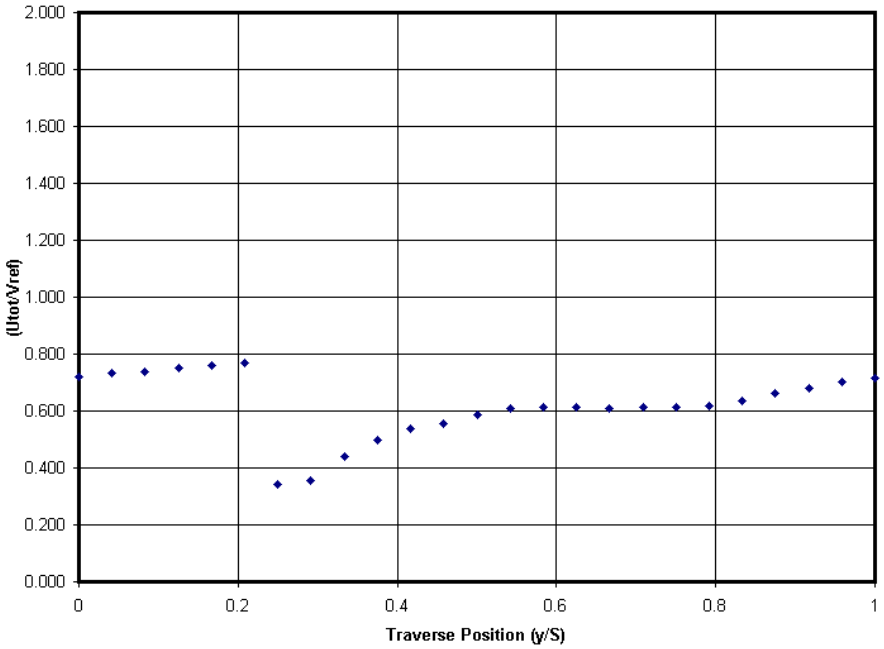
Non-dimensional Velocity Distribution
Station 13 Location 6



Non-dimensional Velocity Distribution
Station 13 Location 7



Non-dimensional Velocity Distribution
Station 13 Location 8



APPENDIX D: MATLAB CODE FOR SURFACE, CONTOUR AND VECTOR SUMMARY PLOTS

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clear

load Sta1_0.dat
y(:,1)=Sta1_0(:,1);
z(:,1)=Sta1_0(:,2);

for i=1:25
   x(i,1)=-.012*.5;
end


load Sta1_1.dat
y(:,2)=Sta1_1(:,1);
z(:,2)=Sta1_1(:,2);

for i=1:25
   x(i,2)=-.212*.5;
end


load Sta1_2.dat
y(:,3)=Sta1_2(:,1);
z(:,3)=Sta1_2(:,2);

for i=1:25
   x(i,3)=-.412*.5;
end


load Sta1_3.dat
y(:,4)=Sta1_3(:,1);
z(:,4)=Sta1_3(:,2);

for i=1:25
   x(i,4)=-.612*.5;
end

load Sta1_353.dat
y(:,5)=Sta1_353(:,1);
z(:,5)=Sta1_353(:,2);

for i=1:25
   x(i,5)=-.718*.5;
end

load Sta1_403.dat
y(:,6)=Sta1_403(:,1);
z(:,6)=Sta1_403(:,2);

for i=1:25
   x(i,6)=-.818*.5;
end

%load Sta1_453.dat
%y(:,7)=Sta1_453(:,1);
%z(:,7)=Sta1_453(:,2);

%for i=1:25
 %  x(i,7)=-.918*.5;
%end
```

```
%load Sta1_478.dat
%y(:,8)=Sta1_478(:,1);
%z(:,8)=Sta1_478(:,2);

%for i=1:25
 % x(i,8)=-.968*.5;
%end


%load Sta1_490.dat
%y(:,9)=Sta1_490(:,1);
%z(:,9)=Sta1_490(:,2);

%for i=1:25
 % x(i,9)=-.98*.5;
%end

load PX1_0.dat
y(:,1)=PX1_0(:,1);
px(:,1)=PX1_0(:,2);

for i=1:25
   x(i,1)=-.012*.5;
end

load PX1_1.dat
y(:,2)=PX1_1(:,1);
px(:,2)=PX1_1(:,2);

for i=1:25
   x(i,2)=-.212*.5;
end


load PX1_2.dat
y(:,3)=PX1_2(:,1);
px(:,3)=PX1_2(:,2);

for i=1:25
   x(i,3)=-.412*.5;
end


load PX1_3.dat
y(:,4)=PX1_3(:,1);
px(:,4)=PX1_3(:,2);

for i=1:25
   x(i,4)=-.612*.5;
end

load PX1_353.dat
y(:,5)=PX1_353(:,1);
px(:,5)=PX1_353(:,2);

for i=1:25
   x(i,5)=-.718*.5;
end

load PX1_403.dat
y(:,6)=PX1_403(:,1);
px(:,6)=PX1_403(:,2);

for i=1:25
   x(i,6)=-.818*.5;
end

%load PX1_453.dat
```

```
%y(:,7)=PX1_453(:,1);
%px(:,7)=PX1_453(:,2);

%for i=1:25
 %  x(i,7)=-.918*.5;
%end

%load PX1_478.dat
%y(:,8)=PX1_478(:,1);
%px(:,8)=PX1_478(:,2);

%for i=1:25
 % x(i,8)=-.968*.5;
%end


%load PX1_490.dat
%y(:,9)=PX1_490(:,1);
%px(:,9)=PX1_490(:,2);

%for i=1:25
 % x(i,9)=-.98*.5;
 %end

load PY1_0.dat
y(:,1)=PY1_0(:,1);
py(:,1)=PY1_0(:,2);

for i=1:25
   x(i,1)=-.012*.5;
end

load PY1_1.dat
y(:,2)=PY1_1(:,1);
py(:,2)=PY1_1(:,2);

for i=1:25
   x(i,2)=-.212*.5;
end


load PY1_2.dat
y(:,3)=PY1_2(:,1);
py(:,3)=PY1_2(:,2);

for i=1:25
   x(i,3)=-.412*.5;
end


load PY1_3.dat
y(:,4)=PY1_3(:,1);
py(:,4)=PY1_3(:,2);

for i=1:25
   x(i,4)=-.612*.5;
end

load PY1_353.dat
y(:,5)=PY1_353(:,1);
py(:,5)=PY1_353(:,2);

for i=1:25
   x(i,5)=-.718*.5;
end

load PY1_403.dat
y(:,6)=PY1_403(:,1);
```

```
py(:,6)=PY1_403(:,2);

for i=1:25
   x(i,6)=-.818*.5;
end

%load PY1_453.dat
%y(:,7)=PY1_453(:,1);
%py(:,7)=PY1_453(:,2);

%for i=1:25
 %  x(i,7)=-.918*.5;
%end

%load PY1_478.dat
%y(:,8)=PY1_478(:,1);
%py(:,8)=PY1_478(:,2);

%for i=1:25
 % x(i,8)=-.968*.5;
%end


%load PY1_490.dat
%y(:,9)=PY1_490(:,1);
%py(:,9)=PY1_490(:,2);

%for i=1:25
 % x(i,9)=-.98*.5;
%end



figure(1)
surf(x,y,z), hold on
contour(x,y,z)
%the x axis on this plot is the y'direction for the traverse
%the y axis on this plot is the x'direction for the traverse
quiver(x,y,py,px),hold off
title('Station 1 Utot/Vref'),ylabel('y/S Positions'),zlabel('Utot/Vref'),xlabel('z/h Locations')
axis([-.5 0 0 1 0 1])
%contour(x,y,z)



%surf(x,y,z1), hold on
%contour(x,y,z)
%quiver(x,y,px,py)

%Output Data for Sta1
Sta1_0
Sta1_1
Sta1_2
Sta1_3
Sta1_353
Sta1_403
%Sta1_453
%Sta1_478
%Sta1_490
```

APPENDIX E: AA3802 FIVE HOLE PROBE DATA

AA3802 TERM PROJECT - Five Hole Probe Experiment - Reduced Data

Z/H	-0.012	-0.212	-0.412	-0.612	-0.718	-0.818	-0.918	-0.968	-0.980		
y/S	Cpt1	Cpt2	Cpt3	Cpt4	Cpt5	Cpt6	Cpt7	Cpt8	Cpt9		
0.0000	0.9962	0.9964	0.9966	0.9958	0.9957	0.9963	0.9964	0.9962	0.9963		
0.0400	0.9964	0.9963	0.9958	0.9960	0.9960	0.9960	0.9962	0.9963	0.9963		
0.0800	0.9963	0.9962	0.9961	0.9962	0.9959	0.9960	0.9960	0.9964	0.9961		
0.1300	0.9963	0.9965	0.9965	0.9962	0.9959	0.9957	0.9962	0.9968	0.9963		
0.1700	0.9966	0.9964	0.9964	0.9962	0.9958	0.9962	0.9959	0.9962	0.9960		
0.2100	0.9962	0.9964	0.9964	0.9961	0.9963	0.9961	0.9965	0.9966	0.9954		
0.2500	0.9962	0.9962	0.9964	0.9963	0.9963	0.9962	0.9964	0.9960	0.9962		
0.2900	0.9962	0.9965	0.9959	0.9964	0.9963	0.9964	0.9962	0.9960	0.9964		
0.3300	0.9965	0.9966	0.9961	0.9960	0.9961	0.9964	0.9961	0.9963	0.9963		
0.3800	0.9965	0.9958	0.9957	0.9959	0.9960	0.9962	0.9962	0.9964	0.9965		
0.4200	0.9966	0.9965	0.9961	0.9958	0.9958	0.9961	0.9962	0.9964	0.9963		
0.4600	0.9966	0.9962	0.9961	0.9962	0.9964	0.9958	0.9965	0.9965	0.9961		
0.5000	0.9966	0.9961	0.9960	0.9964	0.9961	0.9959	0.9965	0.9965	0.9962		
0.5400	0.9965	0.9961	0.9965	0.9961	0.9960	0.9959	0.9962	0.9962	0.9962		
0.5800	0.9964	0.9965	0.9964	0.9963	0.9962	0.9962	0.9962	0.9966	0.9965		
0.6300	0.9967	0.9965	0.9966	0.9965	0.9967	0.9961	0.9963	0.9961	0.9962		
0.6700	0.9964	0.9965	0.9964	0.9963	0.9961	0.9962	0.9961	0.9959	0.9966		
0.7100	0.9966	0.9963	0.9963	0.9963	0.9958	0.9960	0.9963	0.9961	0.9964		
0.7500	0.9963	0.9961	0.9963	0.9960	0.9964	0.9957	0.9964	0.9962	0.9961		
0.7900	0.9967	0.9962	0.9957	0.9961	0.9960	0.9958	0.9959	0.9961	0.9961		
0.8300	0.9965	0.9962	0.9961	0.9961	0.9960	0.9953	0.9964	0.9962	0.9963		
0.8800	0.9966	0.9963	0.9966	0.9955	0.9965	0.9962	0.9963	0.9964	0.9960		
0.9200	0.9962	0.9968	0.9964	0.9963	0.9964	0.9964	0.9963	0.9963	0.9959		
0.9600	0.9965	0.9967	0.9965	0.9961	0.9964	0.9964	0.9961	0.9965	0.9960		
1.0000	0.9966	0.9966	0.9965	0.9961	0.9961	0.9963	0.9961	0.9961	0.9965	Average	Std Dev
AVR	1.0009	1.0029	1.0049	1.0053	1.0067	1.0061	1.0048	1.0052	1.0059	1.0047	0.0018
Loss Coeff.	0.0331	0.0039	-0.0048	0.0307	0.0775	0.1319	0.2148	0.2734	0.3665	0.1252	0.1321

Z/H	-0.012	-0.212	-0.412	-0.612	-0.718	-0.818	-0.918	-0.968	-0.980
y/S	X1	X2	X3	X4	X5	X6	X7	X8	X9
0.000	0.096	0.096	0.097	0.095	0.093	0.090	0.090	0.079	0.072
0.040	0.097	0.098	0.097	0.095	0.093	0.089	0.089	0.082	0.076
0.080	0.097	0.098	0.097	0.094	0.091	0.088	0.088	0.084	0.078
0.130	0.097	0.098	0.097	0.094	0.090	0.088	0.088	0.086	0.082
0.170	0.097	0.098	0.097	0.096	0.091	0.088	0.088	0.085	0.082
0.210	0.096	0.097	0.097	0.096	0.093	0.090	0.090	0.085	0.083
0.250	0.096	0.097	0.097	0.097	0.095	0.092	0.092	0.084	0.078
0.290	0.096	0.097	0.098	0.098	0.096	0.094	0.094	0.081	0.075
0.330	0.096	0.098	0.098	0.098	0.096	0.094	0.094	0.081	0.073
0.380	0.096	0.098	0.100	0.098	0.096	0.094	0.094	0.083	0.075
0.420	0.097	0.100	0.100	0.096	0.094	0.093	0.093	0.085	0.078
0.460	0.097	0.100	0.100	0.096	0.093	0.092	0.092	0.086	0.081
0.500	0.097	0.099	0.099	0.096	0.093	0.091	0.091	0.086	0.080
0.540	0.097	0.098	0.098	0.097	0.094	0.091	0.091	0.084	0.079
0.580	0.097	0.098	0.098	0.097	0.095	0.092	0.092	0.080	0.075
0.630	0.097	0.097	0.097	0.098	0.096	0.094	0.094	0.080	0.073
0.670	0.097	0.098	0.098	0.098	0.097	0.094	0.094	0.082	0.075
0.710	0.097	0.098	0.098	0.097	0.096	0.094	0.094	0.084	0.079
0.750	0.097	0.099	0.099	0.096	0.095	0.093	0.093	0.087	0.083
0.790	0.098	0.099	0.099	0.096	0.093	0.092	0.092	0.089	0.084
0.830	0.098	0.098	0.099	0.096	0.093	0.091	0.091	0.089	0.085
0.880	0.097	0.097	0.098	0.096	0.094	0.092	0.092	0.089	0.083
0.920	0.097	0.097	0.097	0.098	0.096	0.094	0.094	0.087	0.082
0.960	0.096	0.097	0.098	0.098	0.097	0.096	0.096	0.086	0.079
1.000	0.097	0.097	0.098	0.097	0.098	0.095	0.095	0.081	0.076

Z/H	-0.012	-0.212	-0.412	-0.612	-0.718	-0.818	-0.918	-0.968	-0.980
y/S	**PHI1**	**PHI2**	**PHI3**	**PHI4**	**PHI5**	**PHI6**	**PHI7**	**PHI8**	**PHI9**
0.000	0.931	0.931	0.759	1.080	0.852	0.310	0.787	1.084	1.720
0.040	0.894	0.894	1.021	1.036	1.001	0.654	0.931	0.931	1.372
0.080	0.951	0.951	0.967	0.858	1.056	0.897	0.918	0.767	1.285
0.130	0.789	0.789	0.686	0.816	1.068	0.822	0.679	0.417	1.177
0.170	0.626	0.626	0.512	0.463	0.717	0.708	0.828	0.525	1.184
0.210	1.062	1.062	0.629	0.176	0.384	0.248	0.551	0.637	1.052
0.250	1.051	1.051	0.495	0.167	-0.183	0.129	0.056	0.873	1.324
0.290	1.071	1.071	0.962	0.336	-0.041	-0.032	0.333	0.952	1.480
0.330	0.880	0.880	1.157	0.980	-0.220	-0.049	0.823	0.920	1.468
0.380	0.618	0.618	1.306	1.118	0.579	0.023	0.819	0.655	1.399
0.420	0.648	0.648	1.346	1.081	0.712	0.456	0.635	0.638	1.273
0.460	0.525	0.525	1.349	1.013	0.615	0.705	0.082	0.539	1.200
0.500	0.815	0.815	1.206	0.697	0.356	0.799	0.383	0.756	1.273
0.540	0.771	0.771	0.685	0.653	0.414	0.570	0.074	0.968	1.304
0.580	0.861	0.861	0.489	-0.001	-0.112	-0.191	-0.016	1.038	1.343
0.630	0.709	0.709	0.515	0.083	-0.134	0.006	0.412	1.208	1.540
0.670	0.697	0.697	0.590	0.396	-0.014	-0.067	0.343	1.138	1.411
0.710	0.697	0.697	0.776	0.957	0.635	0.477	0.207	1.059	1.230
0.750	0.912	0.912	0.781	1.126	0.847	0.877	0.042	0.831	1.098
0.790	0.687	0.687	1.032	1.131	0.963	0.905	0.481	0.628	1.072
0.830	0.592	0.592	0.713	1.022	0.924	0.897	0.143	0.740	1.031
0.880	0.785	0.785	0.553	0.890	0.367	-0.072	0.194	0.334	1.042
0.920	0.890	0.890	0.343	0.077	-0.055	0.012	0.136	0.351	1.092
0.960	0.822	0.822	0.253	-0.345	-0.311	-0.879	0.322	0.370	1.312
1.000	0.784	0.784	0.298	-0.189	-0.772	-1.019	0.699	0.911	1.467

Z/H	-0.012	-0.212	-0.412	-0.612	-0.718	-0.818	-0.918	-0.968	-0.980
y/S	**PSI1**	**PSI2**	**PSI3**	**PSI4**	**PSI5**	**PSI6**	**PSI7**	**PSI8**	**PSI9**
0.000	0.215	0.118	0.000	0.170	0.470	0.651	0.207	0.207	-0.703
0.040	0.224	0.214	0.126	0.155	0.553	0.796	0.139	0.139	-1.061
0.080	0.195	0.260	0.089	0.158	0.403	0.804	0.113	0.113	-0.991
0.130	0.259	0.292	0.127	0.090	0.428	0.835	0.118	0.118	-0.924
0.170	0.232	0.252	0.051	0.230	0.318	0.590	0.180	0.180	-0.589
0.210	0.209	0.219	0.231	0.197	0.393	0.595	-0.071	-0.071	-0.538
0.250	0.162	0.183	0.029	0.240	0.492	0.561	-0.087	-0.087	-0.420
0.290	0.117	0.136	0.082	0.323	0.600	0.641	0.028	0.028	-0.301
0.330	0.181	0.138	0.128	0.339	0.596	0.723	0.369	0.369	-0.870
0.380	0.062	0.209	0.248	0.315	0.592	0.873	0.343	0.343	-0.826
0.420	0.121	0.340	0.348	0.209	0.551	0.764	0.362	0.362	-0.959
0.460	0.146	0.400	0.393	0.071	0.595	0.925	0.183	0.183	-0.835
0.500	0.166	0.451	0.394	0.011	0.429	0.779	-0.110	-0.110	-0.691
0.540	0.149	0.396	0.228	0.093	0.407	0.671	0.027	0.027	-0.624
0.580	0.229	0.220	0.194	0.083	0.502	0.586	-0.230	-0.230	-0.664
0.630	0.145	0.145	0.080	0.130	0.572	0.654	-0.152	-0.152	-0.574
0.670	0.162	0.204	0.166	0.106	0.639	0.782	0.019	0.019	-1.262
0.710	0.135	0.208	0.203	0.204	0.705	0.887	0.010	0.010	-1.433
0.750	0.172	0.297	0.115	0.168	0.628	0.951	-0.119	-0.119	-1.296
0.790	0.203	0.289	0.209	0.198	0.571	0.808	-0.098	-0.098	-1.181
0.830	0.209	0.252	0.203	0.125	0.417	0.556	-0.244	-0.244	-0.968
0.880	0.226	0.259	0.127	0.284	0.386	0.509	-0.257	-0.257	-0.940
0.920	0.159	-0.009	-0.015	0.292	0.428	0.465	-0.261	-0.261	-0.635
0.960	0.151	0.044	-0.166	0.313	0.347	0.374	-0.236	-0.236	-0.588
1.000	0.278	0.015	-0.192	0.096	0.561	0.654	-0.155	-0.155	-0.533

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